COMMISSIE VAN DE EUROPESE GEMEENSCHAPPEN

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O&O op het gebied van geavanceerde communicatietechnologieën in Europa (RACE)

Eindrapport over fase I (1988-1992) van het tienjarig RACE-programma

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(door de Commissie ingediend op grond van artikel 6, lid 3 en artikel 9 van Beschikking 88/28/EEG van de Raad inzake het RACE-programma)

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Samenvatting

Telecommunicatie speelt tegenwoordig een belangrijke rol bij de meeste industriële activiteiten en is van doorslaggevende betekenis voor de prestaties van de dienstverlenende sector in Europa. Goede telecommunicatie is cruciaal voor het concurrentievermogen van bedrijven. De voltooiing van de Europese Economische Ruimte zonder interne handelsbelemmeringen zal leiden tot nieuwe mogelijkheden, maar ook tot meer concurrentiedruk; door het toenemende belang van telecommunicatie in de internationale handel treden er nu al veranderingen op in de werkwijze van bedrijven. De welvaart in het Europa van de jaren negentig zal voor een belangrijk deel afhangen van goede communicatie.

In de telecommunicatie-, computer- en omroepsector wordt per jaar over de gehele wereld al meer dan 500 miljard ecu omgezet. In het jaar 2000 zal de telecommunicatiesector, na de voedingsmiddelen- en de chemische industrie, in omvang de derde sector van Europa zijn. De telecommunicatie-infrastructuur zal economisch een belangrijker rol gaan spelen dan de vervoersinfrastructuur. Beheersing van de technologische mogelijkheden is daarom een zeer belangrijke factor geworden voor economische groei en het creëren van nieuwe werkgelegenheid. Meer dan 50% van de werkgelegenheid is reeds afhankelijk van het gebruik van informatie- en telematicasystemen en de belangrijkste groei in werkgelegenheid doet zich voor in de informatiesector.

De behoefte aan diensten verandert snel. Bedrijven hebben behoefte aan flexibeler diensten, aan hogere transmissiecapaciteiten voor het snel overbrengen van gegevens en beelden en aan meer concurrerende tarieven. De groei van diensten met toegevoegde waarde via zeer snelle digitale netwerken bedraagt momenteel bijna 40% per jaar, met 40 miljoen dienst-gebruikercombinaties in 1987, 180 miljoen in 1989 en meer dan 300 miljoen in 1991. Tegen het jaar 2000 wordt gerekend met 30% inkomsten uit telecom-municatie afkomstig uit dergelijke diensten met toegevoegde waarde. Binnen een aantal jaren zullen de meeste grote Europese ondernemingen behoefte hebben aan snelle datacommunicatie tussen hun ontwerp-, fabricage-, management- en verkoopactiviteiten. De vraag naar dergelijke diensten is in de VS reeds groot: alle grote onderzoeksinstituten hebben toegang tot zeer snelle datacommunicatiesystemen en 60% van de 500 grootste bedrijven maakt gebruik van zeer snelle digitale transmissielijnen.

De Europese Ministers van Industrie hebben, inspelend op deze trends, het initiatief genomen tot een 'definitiefase' van het RACE-programma. Hieruit kwam naar voren dat er ruimte was voor en behoefte aan een Europees kader voor samenwerking op het gebied van O&O. De beschikking betreffende de eerste fase van een tienjarig RACE-programma (Research and Development in Advanced Communications technologies in Europe) werd in december 1987 door de Raad vastgesteld. In deze beschikking werd het beleid bepaald en de middelen toegewezen, aanvankelijk voor een periode van vijf jaar, tot 1992, uit hoofde van het tweede Kaderprogramma van communautaire werkzaamheden op het gebied van onderzoek en technologische ontwikkeling. Het RACE-programma beoogde "het concurrentievermogen van de telecommunicatiebedrijven, -exploitanten en -dienstverrichters in de Gemeenschap te bevorderen, ten einde de eindgebruikers tegen een zo laag mogelijke prijs en op zo kort mogelijke termijn de beschikking te geven over de diensten die aan het concurrentievermogen van de Europese economie ten grondslag zullen liggen en die de komende decennia tot de instandhouding en schepping van werkgelegenheid in de Gemeenschap zullen bijdragen".

In artikel 9 van de beschikking staat dat *"na afloop van de eerste periode van vijf jaar, [...] de Commissie, na raadpleging van het Comité, over het functioneren en de resultaten van het programma aan de Lid-Staten en het Europese Parlement een verslag [doet] toekomen"*. Dit is het bedoelde verslag, waarmee de na 30 maanden in 1990 gemaakte evaluatie wordt geactualiseerd.

Belangrijkste resultaten

Dankzij de werkzaamheden die gedurende de eerste vijf jaar van het RACE-programma zijn verricht, heeft Europa nu een duidelijke voorsprong op het gebied van de conceptuele ontwikkeling van geavanceerde communicatienetwerken en -diensten. Voor het eerst hebben telecommunicatie-exploitanten, de telematica-industrie en geavanceerde gebruikers in de meeste grote applicatiesectoren hun krachten gebundeld ten einde de geavanceerde communicatietechnologieŠn te ontwikkelen die nodig zijn voor de levering van goedkope en innovatieve diensten. Met het RACE-programma is een uniek klimaat geschapen voor een bundeling van hun krachten.

Het RACE-programma heeft de harmonisatie van de Europese telecommunicatie-infrastructuur versterkt; de ontwikkeling van gemeenschappelijke functionele specificaties (GFS) heeft een 'blauwdruk' opgeleverd voor geþntegreerde breedbandcommunicatie (Integrated Broadband Communications - IBC). Het programma heeft een nauwe samenwerking tussen centrale en meer afgelegen regio's bevorderd en heeft daardoor bijgedragen tot de economische en maatschappelijke samenhang van de Gemeenschap. Wat de technologische ontwikkeling betreft, heeft de komst van de asynchrone transmissietechniek (Asynchronous transfer mode -ATM) voor het zeer snel schakelen van digitale communicatie de Europese industrie een voorsprong gegeven in de internationale concurrentiestrijd; het onderzoek op het gebied van netwerkbeheer heeft de Europese systemen voor netwerkbeheer internationale erkenning bezorgd; de werkzaamheden op het gebied van digitale video en TV hebben geresulteerd in internationale normen voor codering, multi-gigabitsystemen voor signaaldistributie en specificaties voor digitale video-opnamen. Op het gebied van normalisatie heeft het programma geleid tot 596 ontwerp-specificaties voor Europese en internationale instanties - ETSI, CCITT en CCIR (zie bijlage II). Ook is ervoor gezorgd dat het RACE-programma een uitstekende aanvulling vormt op de werkzaamheden in het kader van EUREKA en zijn er meer dan 1700 wetenschappelijke en technische artikelen gepubliceerd in de algemeen beschikbare literatuur (zie bijlage III).

De resultaten van het RACE-programma leveren de Europese telecommunicatie-organisaties en -dienstverleners een strategisch voordeel op in de concurrentiestrijd. In de industrie is men zich bewust geworden van de marktmogelijkheden waarmee de implementatie van de volgende generatie telecommunicatiediensten in Europa gepaard zal gaan. Het programma heeft de voordelen van samenwerking op Europese schaal bij precommercieel O&O duidelijk aangetoond en heeft een aanzienlijke bijdrage geleverd aan de Europese normalisatie in de telecommunicatiesector.

Beheer en evaluatie van het RACE-programma

Het RACE-programma is uniek binnen het tweede Kaderprogramma; het was het enige programma dat werd beheerd als een volledig geþntegreerd takenpakket; ieder project had betrekking op een of meer van een samenhangend geheel van taken op het gebied van O&O, die stuk voor stuk hebben bijgedragen tot de algemene doelstelling:

"De invoering van geþntegreerde breedbandcommunicatie (IBC), rekening houdend met de ontwikkelingen van ISDN en de nationale invoeringsstrategieën, ten einde omstreeks 1995 te komen tot invoering van die diensten in de gehele Gemeenschap."

Het in 1987 aangenomen Werkplan voor het programma gaf het kader aan van het werk van ieder project en hun onderlinge samenhang. Deze interactie werd versterkt door regelmatige overlegvergaderingen ("Concertation meetings") tussen de projecten met discussies betreffende de technische aspecten om de 6 à 8 weken, waaraan alle projecten verplicht waren deel te nemen. De technische resultaten van de projecten zijn verder geconsolideerd door een kernproject verantwoordelijk voor de ontwikkeling van IBC-implementatiestrategieën, functionele referentiemodellen, klantendienstfunkties en referentieconfiguraties. Een sterke en coherente interactie met Europese standaardisatie-organisaties werd voorts verzekerd door een tweede kernproject, verantwoordelijk voor ontwikkeling van consensus en van algemene functionele specificaties.

Het sterk geïntegreerde karakter van het programma komt tot uiting in de evaluatie en de audits van de werkzaamheden die in het kader van het programma zijn uitgevoerd.

Op het niveau van het programma als geheel werd in 1989 een strategische audit uitgevoerd om de werkzaamheden in relatie met de strategische en beleidsdoelstellingen van de Gemeenschap te evalueren. Over de voortgang van de werkzaamheden werd in 1990 verslag uitgebracht aan de Raad en het Europese Parlement in het "rapport na 30 maanden", overeenkomstig de beschikking van de Raad. Vervolgens werden in 1990 de nieuwe behoeften aan O&O opnieuw beoordeeld door een onafhankelijk comité van hogere regeringsfunctionarissen en bedrijfsleiders (Telecom 2000). In 1991 en aan het begin van 1992 werden de werkzaamheden samen met de andere grote programma's inzake IT en telematica van het tweede Kaderprogramma (ESPRIT en DRIVE) geëvalueerd door een onafhankelijk comité[0]. Ten slotte bracht de Commissie in 1992 verslag uit over het programma in de context van de evaluatie van het tweede Kaderprogramma[1] en voerde het beheerscomité van het RACE-programma op verzoek van CREST[2] een eigen evaluatie uit.

De ontwikkeling op het gebied van onderzoek en technologie binnen het programma is gepaard gegaan met regelmatige evaluaties van het economische en maatschappelijke effect van de ontwikkelingen op het gebied van geavanceerde communicatie[3]. De meest recente evaluatie werd in 1991 gehouden en de resultaten zijn in 1992 verspreid. Het grootste deel van deze werkzaamheden is nu volledig geïntegreerd in de tweede fase van het RACE-programma, in overeenstemming met de beschikking van de Raad betreffende het specifieke programma op het gebied van de communicatietechnologieën.

De procedures inzake programmabeheer die door de diensten van de Commissie voor het RACE-programma zijn goedgekeurd, werden in 1989 onderworpen aan een onafhankelijke "audit van het programmabeheer" die resulteerde in een duidelijke goedkeuring van de aanpak van de Commissie.

Op het niveau van de projecten werd ieder project jaarlijks onderworpen aan een "technische audit" door onafhankelijke deskundigen op het betrokken onderzoeksgebied. De eerste technische audit vond plaats in oktober 1988 en de laatste in oktober 1992. De resultaten van deze jaarlijkse audits zijn gebruikt om de werkzaamheden van de projecten waar nodig bij te sturen of te beëindigen.

Uit alle evaluaties en audits is gebleken dat het RACE-programma succesvol is geweest ten aanzien van de oorspronkelijke doelstellingen.

De werkzaamheden die zijn gestart tijdens de eerste fase van het RACE-programma zijn inmiddels voortgezet en uitgebreid door middel van O&O-projecten in het kader van het nieuwe specifieke programma voor onderzoek en technologische ontwikkeling op het gebied van communicatietechnologie, de tweede fase van het RACE-programma. Dit is een onderdeel van het derde Kaderprogramma van de EG en voorziet in een gedeeltelijke financiering door de EG van O&O tot december 1994. Deze projecten zijn in januari 1992 gestart. Dankzij de overlapping met projecten uit de eerste fase van het RACE-programma kon de continuïteit van de werkzaamheden worden gewaarborgd. Het programma zal een belangrijke bijdrage blijven leveren aan de economische ontwikkeling en de sociaal-economische integratie van Europa. Het gaat gepaard met nationale activiteiten[4] en internationale acties, zoals die van EURESCOM[5], die de EG-activiteiten ondersteunen en daar op hun beurt ook door ondersteund worden. Het RACE-programma vormt een uniek kader waarbinnen exploitanten van telecommunicatienetwerken, de industrie en de gebruikers intens samenwerken.

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[0] Het rapport van het comité voor de evaluatie van informatie- en communicatietechnologie, onder voorzitterschap van W. Dekker, juni 1992.
[1] Mededelingen van de Commissie betreffende de "Evaluatie van het tweede Kaderprogramma van communautaire werkzaamheden op het gebied van onderzoek en technologische ontwikkeling (SEC(92)675 def.), juli 1992.
[2] Weergegeven in dit rapport onder 3.2.1.
[3] De verslagen van deze evaluaties zijn gepubliceerd en verspreid als de reeks rapporten over "Perspectieven voor Geavanceerde Communicatie in Europa: PACE"
[4] Er zijn Breedband Communicatie Proefprojecten in B, D, DK, F, Irl, P and in de UK.
[5] European Institute for research and strategic studies in telecommunications GmbH.

O&O op het gebied van geavanceerde communicatietechnologieën in Europa (RACE)

Eindrapport over fase I (1988-1992) van het tienjarig RACE-programma

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1. Inleiding

De telecommunicatiesector is de meest dynamische en snelst groeiende van alle industriële sectoren in Europa. De telecommunicatiediensten zorgen in Europa voor een omzet van meer dan 300 miljard ecu per jaar en er wordt bijna 30 miljard ecu per jaar geïnvesteerd in telecommunicatienetwerken en -diensten. De inkomsten zijn nog altijd voor een groot deel afkomstig uit de spraakcommunicatie (telefonie), maar de meeste kapitaalinvesteringen worden op dit moment gedaan op het gebied van nieuwe generaties digitale apparatuur, die de integratie van stem-, gegevens- en beeldcommunicatie mogelijk maken. In het jaar 2000 zou tot 30% van de inkomsten uit telecommunicatie afkomstig zijn van diensten met toegevoegde waarde waarbij gebruik wordt gemaakt van geavanceerde datacommunicatiesystemen.

In de hele wereld wordt het leven op alle niveaus beïnvloed door het naar elkaar toegroeien van informatietechnologie, omroep en telecommunicatie. De combinatie van technieken voor gegevensverwerking met innoverende ideeën in de telecommunicatie heeft reeds geleid tot de implementatie van Digitale Netwerken voor Geïntegreerde Diensten (Integrated Services Digital Networks; ISDN); dit vormt echter slechts een eerste stap in een snelle ontwikkeling naar een veel breder scala van multi-mediadiensten waarvoor nieuwe technologieën, beheerssystemen voor netwerken en diensten en nieuwe voorschriften noodzakelijk zullen zijn. De combinatie van geïntegreerde diensten met glasvezel, waardoor goedkope en zeer snelle transmissie van gegevens mogelijk wordt (een miljoen maal sneller dan via koperdraad), vormt de technische en economische basis voor een fundamentele herstructurering van alle sectoren door middel van geïntegreerde breedbandcommunicatie (IBC). De ontwikkeling van dit concept is het doel van het RACE-programma.

In dit rapport worden de resultaten van de eerste fase van het tienjarig RACE-programma samengevat en toegelicht.

In hoofdstuk 2 worden de achtergrond, organisatie en resultaten van het programma besproken en in hoofdstuk 3 worden de organisatie en resultaten van de evaluaties en audits van het programma samengevat. Hoofdstuk 4 bevat een bespreking van de relaties met andere acties in EG- en Europees verband. De resultaten van O&O-activiteiten in de eerste fase van het RACE-programma zijn reeds op grote schaal benut, bij de ontwikkeling van normen, nieuwe netwerken en diensten, maar ook als basis voor toekomstige werkzaamheden in de tweede fase van het RACE-programma. De benutting van de resultaten van de eerste fase van het RACE-programma wordt in hoofdstuk 5 beschreven en de overgang naar fase II komt in hoofdstuk 6 aan de orde. Toekomstige eisen en mogelijkheden voor O&O op Europees niveau worden in hoofdstuk 7 aangegeven.

In bijlage I wordt de gedetailleerde informatie over de resultaten van O&O-projecten samengevat. De bijdragen aan normalisatie worden in bijlage II op een rij gezet en in bijlage III volgt een opsomming van alle wetenschappelijke en technische publikaties die uit de werkzaamheden zijn voortgevloeid. Aanvragen voor de registratie van octrooien worden genoemd in bijlage IV; in bijlage V volgt een woordenlijst met technische termen en bijlage VI bevat een lijst van verwijzingen naar de officiële besluiten van de Raad en de Mededelingen van de Commissie. De O&O-projecten die onder fase 1 van het RACE-programma werden gefinancierd, zijn te vinden in bijlage VII; van de betrokken organisaties wordt in bijlage VIII een overzicht gegeven en de statistische gegevens over de financiering en de deelneming worden in bijlage IX samengevat.

2. Achtergrond en organisatie van het RACE-programma

2.1 O&O als onderdeel van het communautaire telecommunicatiebeleid

Het RACE-programma vormt een wezenlijk bestanddeel van het communautaire telecommunicatiebeleid. Het is gekoppeld aan het normalisatiebeleid en het beleid voor de informatiemarkt en bouwt voort op ontwikkelingen in de informatietechnologie in het kader van ESPRIT. Bovendien worden in dit programma voor het eerst ook de Europese exploitanten van telecommunicatienetwerken als belangrijke geïnteresseerden betrokken bij de gezamenlijke ontwikkeling van technologie en diensten. Door aandacht te besteden aan de verbetering van de prijs/prestatieverhouding van de communicatie-infrastructuren in Europa heeft het RACE-programma bijgedragen tot de ontwikkeling van de interne markt, het internationale concurrentievermogen van het Europese bedrijfsleven en de sociaal-economische samenhang van de Gemeenschap.

De belangrijkste doelstellingen van het telecommunicatiebeleid van de Gemeenschap, zoals aangegeven in de Resolutie van de Raad van juni 1988[6], zijn:

- het tot stand brengen of waarborgen van de integriteit van netwerken in de gehele Gemeenschap, waarbij wordt uitgegaan van het beginsel van volledige interconnectiviteit van alle betrokken openbare netten;
- het geleidelijk tot stand brengen van een open gemeenschappelijke markt voor telecommunicatiediensten;
- het stimuleren van de totstandkoming van geheel Europa bestrijkende diensten overeenkomstig de vereisten van de markt en de sociale behoeften;
- het verder uitbouwen van een open communautaire markt voor eindapparatuur;
- het ontwikkelen van een gemeenschappelijke markt waarop telecommunicatie-administraties en andere aanbieders van diensten op gelijke voet kunnen concurreren;
- het continueren van communautaire maatregelen betreffende gemeenschappelijke normen;
- het stimuleren van Europese samenwerking op alle niveaus, met name op het gebied van onderzoek en ontwikkeling van telecommunicatie;
- het creëren van een maatschappelijk klimaat voor de toekomstige ontwikkeling van de telecommunicatie;
- het volledig integreren van de minder ontwikkelde regio's van de Gemeenschap in de communautaire markt in wording.

Deze doelstellingen vormen een duidelijk kader voor de verdere ontwikkeling van technologie, diensten en applicaties in de toekomst.

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[6] Resolutie van de Raad van 30 juni 1988 betreffende de ontwikkeling van de gemeenschappelijke markt voor telecommunicatiediensten en -apparatuur tot 1992; 88/C 257/01; PB nr. C 257 van 4.10.88, blz. 1.

2.2 De doelstellingen van RACE

De belangrijkste doelstelling van het RACE-programma is bij te dragen tot:

"De invoering van geïntegreerde breedbandcommunicatie (IBC)[7], rekening houdend met de ontwikkelingen van de ISDN en de nationale invoeringsstrategieën, ten einde omstreeks 1995 te komen tot invoering van die diensten in de gehele Gemeenschap.[8]"

De specifieke doelstellingen van fase 1 waren:

- stimulering van de telecommunicatie-industrie in de Gemeenschap;
- Europese netwerkexploitanten in staat stellen onder zo gunstig mogelijke omstandigheden te concurreren;
- een kritisch minimum aantal Lid-Staten in staat stellen om in 1995 commercieel levensvatbare IBC-diensten te introduceren;
- dienstverlenende bedrijven de mogelijkheden verschaffen om hun prijs/prestatieverhouding te verbeteren en nieuwe diensten te introduceren; nieuwe diensten toegankelijk maken tegen een prijs en op een termijn die ten minste even gunstig zijn als elders;
- bijdragen aan de totstandkoming van een communautaire interne markt voor telecommunicatieapparatuur en -diensten;
- bijdragen tot regionale ontwikkeling door minder ontwikkelde regio's in staat te stellen ten volle te profiteren van de ontwikkelingen in de telecommunicatie.

Voorts werd in bijlage I bij de beschikking een aantal technische doelstellingen geformuleerd. De bijdrage van de O&O-projecten van het RACE-programma aan het bereiken van deze doelstellingen wordt uiteengezet in tabel I.

Tijdens de ontwikkeling en uitvoering van het programma heeft de interpretatie van het concept geïntegreerde breedbandcommunicatie een ontwikkeling ondergaan, als reactie op de veranderende omstandigheden op de markt en in de regelgeving. De hier gegeven definitie geeft weer welke consensus er in 1990 is ontstaan binnen het Beheerscomité van het RACE-programma.

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7 "I": "Integrated" (geïntegreerd) betekent niet alleen "geïntegreerde diensten" (op gebruikersniveau en op de desbetreffende werkniveaus), maar wijst ook op de "integriteit" van het gehele netwerk en derhalve op een correcte samenwerking tussen alle essentiële onderdelen, zowel bestaand als in wording: POTS, pakketten, ISDN, satellieten, mobiel, enz.

"B": "Breedband" betekent niet alleen het gedeelte van de diensten in het "hoge spectrum" (wat bitsnelheid betreft), maar wijst ook op de totale dienstencombinatie die in aanmerking komt, vanaf de "bovenkant" van het ISDN (bijvoorbeeld in ieder geval met de toegang op 2 Mbit/s en mogelijkerwijs zelfs met 64 Kbit/s op specifieke toepassingsgebieden) tot de toegang die bij een realistische invoering van (interactieve en distributieve) videodiensten nodig zal zijn (bij voorbeeld 140 Mbits/s).

"C": "Communicatie" betekent niet alleen de "conventionele" schakel/transmissie/CPN-functies, maar omvat tevens de meest geavanceerde aspecten die moeten zorgen voor een gebruikersvriendelijke, krachtige en economisch gezonde dienstverlening.

8 Beschikking van de Raad van 14 december 1987 inzake een programma van de Gemeenschap op het gebied van telecommunicatietechnologieën - O&O op het gebied van geavanceerde communicatietechnologieën in Europa (RACE-programma); 88/28/EEG: PB nr. L 16 van 21.1.88, blz. 35.

TABEL 1

Doelstellingen	Wijze waarop in RACE aan deze doelstellingen wordt gewerkt	Effecten van de werkzaamheden in het kader van RACE
Doelstellingen van deel I: strategieën voor de ontwikkeling en het opzetten van IBC		
Overeenstemming over de evolutie van IBC en de gevolgen daarvan	Totstandbrenging van een kader voor samenwerking tussen exploitanten, de industrie en gebruikers	Ontwikkeling van een gemeenschappelijke, op "system engineering" gebaseerde benadering van de planning van netwerkevolutie
	Gemeenschappelijk strategisch technisch-economisch onderzoek waarbij rekening wordt gehouden met de vraag en de technologische keuses.	Definitie van de optimale omstandigheden voor de invoering van IBC
		Gemeenschappelijk vaststellen van belangrijke technische problemen.
		Een samenhangend standpunt van de EG op het gebied van internationale activiteiten buiten het RACE-programma.
Gemeenschappelijke definitie van IBC-systemen en -subsystemen	Opstelling van een referentieconfiguratie voor definitie van de (sub)-systemen in IBC-netwerken	Verbetering van de Europese normalisatie.
	Ontwikkeling van geschikte mogelijkheden en technieken voor implementatie	Overeenstemming over een gemeenschappelijke Europese strategie op het gebied van ATM-specificaties
Richtsnoeren voor de functionele specificatie van het IBC-systeem en geïntegreerde diensten	Ontwikkeling van een functioneel referentiemodel met een logische structuur van functies en interfaces	Overeenstemming over gemeenschappelijke functionele specificaties
		Overeenstemming over concepten en protocollen voor "netwerkintegratie"
		Overeenstemming over de mogelijkheden op de middellange/lange termijn voor de toegankelijkheid van breedband voor gebruikers
Specificatie van eisen ten aanzien van technologie en O&O	Gezamenlijke ontwikkeling van een gebruiks-referentiemodel om de eisen van gebruikers te koppelen aan de technische mogelijkheden	Gerichte aandacht voor Europees O&O op het gebied van belangrijke technologieën en nieuwe behoeften van de gebruikers
	Gezamenlijke en gemeenschappelijke beoordeling van de technologische ontwikkelingen	
Zicht krijgen op de rentabiliteit van verschillende implementatieschema's	Ontwikkeling van gemeenschappelijke gereedschappen voor technisch-economische en operationele evaluaties	Gemeenschappelijke gereedschappen zijn ontwikkeld voor technisch-economische analyse, geavanceerde netwerkplanning en netwerkbeheer
Analyse van normalisatie-eisen	Regelmatige bijeenkomsten met de normalisatie-instanties; coördinatie tussen het Consensus Management Project en ETSI, en gezamenlijk onderzoek van de normalisatie-eisen aan de hand van veranderingen in de behoeften van gebruikers op wereldschaal	576 bijdragen aan normalisatie-instanties (bijlage II)

Tabel 1

Doelstellingen	Wijze waarop in RACE aan deze doelstellingen wordt gewerkt	Effecten van de werkzaamheden in het kader van RACE
Doelstellingen van deel II: IBC-technologie		
Gebruik van geavanceerde technologie voor rendabele implementatie van IBC.	O&O naar rendabele optische componenten, subsystemen en systemen voor zowel breedbandtransmissie naar de gebruiker als voor schakeling.	Specificatie en ontwikkeling van prototypen voor connectoren, lasers en schakelelementen voor lokale netwerken, CPN's ens. Demonstratie van prototypen en goedkope produktiemethoden.
	Ondersoek naar mogelijkheden op korte termijn met het oog op onmiddellijke kostenbesparing.	Ontwikkeling van "directe" en "coherente" detectietechnologieën. Ontwikkeling van ATM-technologieën voor rendabel gebruik van bandbreedte.
	Ondersoek naar mogelijkheden op middellange/lange termijn voor aansienlijke kostenbesparing en betere dienstverlening.	Ontwikkeling van compatibele algoritmen voor bitsnelheids-compressie voor digitale HDTV en videodiensten van hoge kwaliteit en goedkope CODEC- ontwikkeling.
Telecommunicatiesoftware voor complexe geïntegreerde systemen.	Ontwikkeling van een nieuwe architectuur voor dienstverlening: open dienstenarchitectuur.	Ontwikkeling van een "objectgerichte" programmering voor telecomsystemen. Het valideren van prototypen voor Integrated Software Engineering tools.
	Bestudering van technieken voor geavanceerde informatieverwerking voor IBC-functies.	Ontwikkeling van TMN-architecturen en prototypen voor verkeersbeheersing, onderhoud,. kwaliteitscontrole van diensten, klanten- en netwerkadministratie en beveiligde communicatie.
	Bestudering van nieuwe softwaretechnologie voor de specificatie, het ontwerp, de implementatie, de controle en het onderhoud van telecomsystemen.	Specificatiemethoden, ontwikkelingsomgeving en on-line ondersteuning voor telecomsystemen.
Vooruitgang ten aansien van de ergonomische en cognitieve eigenschappen van IBC-apparatuur.	Ondersoek naar de bruikbaarheidsaspecten van dialoog, distributie, terugsoeken en gentegreerde diensten en huis-CPN's.	Bepalen van integriteitsconcepten voor IBC-diensten en een reeks basiselementen van integriteit.
	Ondersoek naar de bruikbaarheidsaspecten voor mensen met speciale behoeften (ouderen en gehandicapten).	Een taxonomie voor bruikbaarheidstechnieken.
	Ontwikkeling van doelstellingen in verband met de bruikbaarheid van ontwerpen.	Implementatie van voorsieningen die gemakkelijk in het gebruik zijn, bij geavanceerde communicatie-experimenten, inclusief voorsieningen voor mensen met speciale behoeften.
	Opname en evaluatie van bruikbaarheidsaspecten in experimentele toepassingen.	Verbeterde interactie tussen bruikbaarheidsondersoekers, gebruikers en apparatuurontwerpers.
		Systematisch vastleggen en analyseren van gemeenschappelijke bruikbaarheidsaspecten in experimentele toepassingen.

TABEL 1

Doelstellingen	Wijze waarop in RACE aan deze doelstellingen wordt gewerkt	Effecten van de werkzaamheden in het kader van RACE
Bouw van evoluerende subsystemen en netwerken.	Definitie en demonstratie van generieke architecturen voor IBC-systemen en -subsystemen, met inbegrip van bitvolumebeperking voor video.	Definitie van functionele en ontwerpspecificaties voor lokale netwerken, CPN's en terminals (meervoudige diensten, multi-media, inclusief digitale video-opname en vlakke beeldschermen).
	Ontwerpen van concepten en kaders voor bij de gebruiker geïnstalleerde netwerken (CPN's), om te kunnen voldoen aan de eisen van huishoudens en bedrijven.	Demonstratie van een vlak EL-kleurenbeeldscherm en driver
	Ontwikkeling van prototypen voor eindapparatuur	Ontwerpen van componenten en subsystemen voor CPN's in huishoudens en bedrijven in een ATM-omgeving.
	Aanpassen van systemen, waardoor een geleidelijke overgang naar IBC mogelijk is.	Specificaties voor geïntegreerde systemen en het valideren daarvan met behulp van demonstratiemodellen.
	Ontwikkeling van prototypen voor geïntegreerde systemen met lokale netwerken, CPN's en terminals, onderling gekoppeld via overeengekomen interfaces.	
Doelstellingen van deel III: Ontwikkeling van IBC-applicatiesystemen		
Ontwikkeling van verificatiegereedschappen, verificatie van ontwerpconcepten, functionele groepen of protocollen.	Gezamenlijke ontwikkeling van gereedschappen en testprocedures voor elementen en subsystemen van IBC-netwerken.	Verificatie van gereedschappen en IBC-functies voor terminals, CPN's en schakeling in lokale en interlokale centrales.
	Verificatie van protocollen op kritieke IBC-referentiepunten.	Identificatie van toegangspunten en protocollen voor testen. Aanbevelingen voor het testen van protocol-conformiteit
Verfijning van functionele specificaties en/of verificatie van normvoorstellen.	Integratie van experimentele systemen om interworking-protocollen te testen.	Specificaties van systemen en subsystemen in een omgeving met meervoudige diensten.
	Prenormatieve verificatie van kritieke punten op het gebied van normalisatie en specificatie.	Het valideren van mechanismen om interoperabiliteit te demonstreren en aan te tonen dat aan de normen is voldaan.
Ontwikkeling van experimentele situaties waar dienstverleners, netwerkexploitanten en gebruikers experimentele IBC-produkten kunnen testen - om inzicht te krijgen in de mogelijkheden voor commerciële exploitatie van IBC.	Definitie van eisen voor toekomstige diensten in samenwerking met geavanceerde gebruikers uit alle belangrijke sectoren van het zakenleven.	Uitvoering van proefprojecten in alle belangrijke sectoren: banken en financiële wereld, verzekeringen, media en uitgeverijen, industriële fabricage, gezondheidszorg, mensen met speciale behoeften, vervoer en distributie, experimenteel gebruik van HDTV.
	Opbouw van een testsysteem voor IBC op verschillende locaties in Europa.	
	Ondersoek op het gebied van interconnectie en interworking	Definitie van vereisten voor en overeenstemming over een testsysteem voor interconnection trials.

2.3 De uitvoering van het programma

Met het oog op de snelle ontwikkeling van de telecommunicatiesector in Europa is gekozen voor een gefaseerde uitvoering van het RACE-programma. Het programma begon met een definitiefase in 1986[9]. Hierop volgde fase I, onderwerp van dit rapport, die formeel begon in 1987 en eindigde in december 1992.

Gedurende fase I waren de werkzaamheden ingedeeld in drie delen:

Deel I - Strategieën voor de ontwikkeling en het opzetten van IBC

In deel I werd aandacht besteed aan de uitwerking van functionele specificaties, onderzoek inzake systemen en exploitatie met het oog op de formulering van voorstellen voor IBC-normen, -concepten en -conventies die aan een open-systeemaanpak beantwoorden, alsmede aan analytische werkzaamheden op het gebied van de interoperabiliteit van IBC-apparatuur en -diensten. De resultaten van deel I zijn openbaar en vormen een belangrijke bijdrage aan de werkzaamheden van de internationale normalisatie-instanties.

Deel II - IBC-technologie

De projecten van deel II hadden betrekking op de technische uitdagingen die zijn verbonden aan de invoering van IBC. Zij hebben een belangrijke bijdrage geleverd tot de ontwikkeling van de technologie die vereist is voor de verwezenlijking van betaalbare IBC-apparatuur en -diensten.

Deel III - Prenormatieve functionele integratie

De projecten van deel III waren gericht op prenormatieve doelstellingen in verband met het opzetten van een "open verificatieomgeving" om functies en operationele concepten te testen. Twintig van de projecten van dit programma-onderdeel hadden betrekking op experimentele toepassingen van geavanceerde communicatie in diverse zakelijke en dienstverlenende omgevingen. Tijdens deze projecten werden experimentele apparatuur en toepassingen getoetst aan reële voorstellen voor functionele specificaties en normen die in de projecten van deel I waren geformuleerd.

Het RACE-programma werd in twee gedeelten uitgevoerd. De eerste serie projecten startte in januari 1988 en was gericht op het ontwerpen van systemen (deel I) en technologische werkzaamheden (deel II)[10]. Voor het tweede gedeelte, dat betrekking had op de bestudering van toekomstige diensten, integratie en verificatie van systemen (deel III), werd in juli 1988 een uitnodiging tot het indienen van voorstellen gepubliceerd. Deze projecten startten in januari 1989.

Tijdens de selectie van projecten en de uitvoering van het programma zijn de accenten op de verschillende onderdelen van het programma verschoven. Zo werden de financiële middelen voor deel I verhoogd van de geraamde 11,9% tot 18%, voor deel II verlaagd van 66% tot 55% en voor deel III verhoogd van 22,4% tot 27%. Dit was deels het gevolg van een accentverschuiving van technologische ontwikkeling naar de ontwikkeling van diensten en bestudering van de vraag, en deels van het gehalte van de voorstellen voor werkzaamheden in het kader van deel I en III van het programma.

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[9] Besluit van de Raad van 25 juli 1985 inzake een definitiefase voor een actie van de Gemeenschap op het gebied van telecommunicatietechnologieën - O&O op het gebied van geavanceerde communicatietechnologieën voor Europa (RACE): 85/372/EEG; PB nr. L 210 van 7.8.1985, blz. 24.

[10] Mededeling van de Commissie aan de Raad en het Parlement "Op weg naar Telecom 2000 - De start van het RACE-programma" - COM(88) 240 def. II van 31.5.88.

De verdeling van de financiële middelen van het programma is aangegeven in tabel 2.

TABEL 2

Overzicht van het gebruik van de financiële middelen in Fase I van het RACE-Programma

PROGRAMMA	BESCHIKKING (milj. Ecu)	(%)	FEITELIJK (%)
Deel I	60	11,9	18,0
I.1 IBC-strategieën	14	2,8	
I.2 Totstandbrenging IBC	28	5,5	
I.3 Gebruik van IBC	10	2,0	
I.4 Gemeenschappelijke operationele omgeving	8	1,6	
Deel II	332	65,7	55,0
II.1 Technieken voor IBC-systeemfuncties	94	18,6	9,0
II.2 IBC-programmerings-infrastructuur	49	9,7	25,0
II.3 Gebruiksvriendelijk ontwerpen	12	2,4	11,0
II.4 Ontwikkeling van netwerken	177	35,0	10,0
Deel III	113	22,4	27,0
III.1 Verificatiehulpmiddelen	63	12,5	6,0
III.2 Experimentele IBC-toepassingen	50	9,9	

Bij de 92 O&O-projecten waren 306 bedrijven betrokken, waaronder alle grote Europese telecommunicatiebedrijven. Voorts hebben 27 organisaties uit EVA-landen (Oostenrijk, Finland, Noorwegen, Zweden en Zwitserland) aan de werkzaamheden deelgenomen.

2.4 De belangrijkste resultaten

Het RACE-programma heeft de harmonisatie van de Europese telecommunicatie-infrastructuur versterkt, wat een vereiste is voor de voltooiing van de interne markt. De gemeenschappelijke functionele specificaties vormen een 'blauwdruk' voor Europese geïntegreerde breedbandcommunicatie. Dit kon slechts worden bereikt dankzij de medewerking van alle Europese netwerkexploitanten, de telecommunicatie-industrie, de omroepsector en de belangrijkste geavanceerde gebruikers; een samenwerking die kenmerkend was voor het RACE-programma.

Doordat het RACE-programma heeft geleid tot een vroegtijdige bewustwording van en reactie op veranderingen, heeft het er tevens in belangrijke mate toe bijgedragen dat de Europese telecommunicatie- en dienstverlenende bedrijven in de concurrentiestrijd een strategische voorsprong hebben kunnen nemen op de - in toenemende mate mondiale - markt voor telecommunicatieapparatuur en -diensten.

In bijlage I van dit rapport en in de jaarverslagen van 1988, 1989, 1990, 1991 en 1992 worden de resultaten van ieder project gedetailleerd beschreven. De belangrijkste resultaten op ieder gebied van het programma worden hierna beschreven.

Belangrijkste resultaten van deel I: strategieën voor de ontwikkeling en het opzetten van IBC

De werkzaamheden hebben geleid tot een gemeenschappelijk inzicht in de ontwikkeling van IBC en de implicaties daarvan; effectieve samenwerking tussen exploitanten, het bedrijfsleven en gebruikers bij de ontwikkeling van gemeenschappelijke functionele specificaties voor IBC en bij gemeenschappelijke strategische technisch-economische onderzoeken.

Er is een nauwe samenwerking tot stand gebracht tussen Europese en internationale normalisatie-instanties. In 1989 werd een werkgroep in het leven geroepen om te zorgen voor de coördinatie tussen het Consensus Management Project en het Europese Instituut voor Telecommunicatienormen (ETSI). De werkzaamheden op het gebied van de Asynchrone Transmissietechniek (ATM) hebben direct bijgedragen tot de overeenstemming over een gemeenschappelijke Europese strategie op dat gebied en tot de ontwikkeling van internationale normen.

Over gemeenschappelijke definities van IBC-systemen en -subsystemen is overeenstemming bereikt en er zijn referentieconfiguraties ontwikkeld voor het bepalen van de systeemstructuur van het Netwerk voor Geïntegreerde Breedbandcommunicatie. De functionele specificatie van IBC-systemen en geïntegreerde diensten zijn goedgekeurd en er bestaat inmiddels een functioneel referentiemodel. In dit model wordt een logische structuur aangegeven van de IBC-functies en -interfaces en het fungeert als een centraal verzamelpunt voor alle functionele vereisten voor implementatie. De gemeenschappelijke functionele specificaties (GFS) zijn in 1990 op grote schaal verspreid.

Er zijn interface-definities vastgesteld op belangrijke referentiepunten in breedbandnetwerken en er zijn vereisten aangegeven voor componenten en systemen.

Er is een "gebruiks-referentiemodel" ontwikkeld als conceptueel kader voor de koppeling van gebruikerseisen aan functionele eisen.

Er zijn systematische beoordelingen uitgevoerd van technische en operationele mogelijkheden, waaronder optische communicatie, mobiele communicatie, satellieten, CPN's, nieuwe schakeltechnieken en HDTV.

Er zijn gereedschappen ontwikkeld voor de evaluatie van de rentabiliteit van verschillende implementatieschema's: een eerste set dient voor economische analyse en een tweede voor netwerkplanning en normen. Deze gereedschappen vormen de basis voor transnationale vergelijkingen van de mogelijkheden en strategieën in samenhang met technische en economische kenmerken en normalisatievereisten.

Belangrijkste resultaten van deel II: IBC-technologieën

De O&O-projecten waren gericht op rendabele optische componenten, subsystemen en systemen voor zowel breedbandtransmissie naar de klant als voor schakeling, met als doel goedkope oplossingen voor toepassingen op alle gebieden.

Er zijn ATM-technologieën gedefinieerd en ontwikkeld voor een flexibeler en duurzamer implementatie van breedbandcommunicatie. De verschillende mogelijkheden van ATM zijn gerealiseerd en vergeleken en er zijn specificaties ontwikkeld voor de vereisten voor ATM-schakelsystemen.

Er zijn compatibele videocodeertechnieken voor (HD)TV en beeldtelefoon ontwikkeld, waarbij op efficiënte wijze gebruik wordt gemaakt van bandbreedte. Het gebruik van algoritmen voor bitsnelheidscompressietechnieken voor videodiensten van hoge kwaliteit (TV en beeldtelefoon) is gesimuleerd en de ontwikkeling CODEC's heeft reeds een aanzienlijk effect gehad op de normalisatie en commerciële invoering van goedkopere methoden voor het vergaderen via beeldverbindingen (videoconferentie).

Belangrijke vooruitgang is geboekt bij multi-gigabit optische communicatiesystemen en fotonische schakeling. Er zijn specificaties ontwikkeld voor systemen, subsystemen en componenten (connectoren, lasers, schakelelementen, enz.), waarbij in het bijzonder wordt gelet op kostenaspecten op verschillende toepassingsgebieden (lokale netwerken, CPN's, enz.). Prototypen voor componenten en subsystemen zijn geproduceerd en gedemonstreerd.

Op het gebied van telecommunicatiesoftware voor complexe geïntegreerde systemen zijn objectgerichte modellen ontwikkeld; voorts zijn er architecturen en prototypen voor verkeersregeling, onderhoud en klanten- en netwerkadministratie gedefinieerd; ook zijn er specificatiemethoden en een "ontwikkelingsomgeving" voor on-line ondersteuning van telecomsystemen ontwikkeld. En ten slotte is een architectuur gedefinieerd voor beveiligde communicatie.

Op het gebied van ergonomisch en cognitief onderzoek is een taxonomie voor gebruiksvriendelijk ontwerpen gerealiseerd en er zijn eisen ten aanzien van gebruikersvriendelijkheid voor geavanceerde communicatie vastgesteld, ook voor mensen met speciale behoeften.

Er zijn generieke architecturen en passende technieken en technologieën voor IBC-systemen en -subsystemen ontwikkeld, met inbegrip van bitvolumevermindering voor video. Deze fungeren als kader om in een groot aantal verschillende toepassingen te kunnen voldoen aan de eisen van huishoudens, bedrijven en andere gebruikers.

Verschillende soorten terminals met vlakke beeldschermen zijn getest en aangepast aan het gebruik in combinatie met IBC-diensten. Er zijn geïntegreerde systemen (waaronder lokale netwerken, CPN's en terminals, onderling gekoppeld via overeengekomen interfaces in het S- en T-referentiepunt), om functionele specificaties en technologieën te valideren.

Het onderzoek op het gebied van "mobiele communicatie" heeft geleid tot een conceptueel kader voor een derde generatie van op radio gebaseerde cellulaire communicatie. Dit heeft geresulteerd in de definitie van Universal Mobile Telecommunications (UMTS), waarmee kan worden voldaan aan de belangrijkste eisen van de Europese markt halverwege de jaren negentig.

De belangrijkste resultaten van deel III: ontwikkeling van IBC-applicatiesystemen

Deze werkzaamheden waren gericht op de ontwikkeling van verificatiegereedschappen en de verificatie van ontwerpconcepten, functionele groepen of protocollen. Terminals, CPN's, systemen voor toegang van de gebruiker, schakeling (in lokale en interlokale centrales) en transmissiesystemen zijn uitvoerig getest via procedures die gezamenlijk zijn ontwikkeld door systeemontwerpers en ontwerpers van testgereedschappen. Voorts zijn er toegangspunten en protocollen voor testen aangegeven.

Bij de experimentele toepassingen van IBC werden dienstverleners, netwerkexploitanten en gebruikers betrokken bij het testen van experimentele IBC-produkten ten einde het inzicht in de kenmerken van de commerciële exploitatie van IBC te bespoedigen. De experimentele toepassingen zijn in alle belangrijke sectoren gerealiseerd: banken en financiële wereld, verzekeringen, media en uitgeverijen, industriële fabricage, gezondheidszorg, mensen met speciale behoeften, vervoer en distributie en experimenteel gebruik van HDTV. Meer dan 100 geavanceerde gebruikers hebben hieraan deelgenomen.

Men heeft ingezien dat er voor de uitvoering van fase III en enkele aanvullende werkzaamheden in deel I en II behoefte was aan een testinfrastructuur op Europese schaal. In 1989 dienden de belangrijkste Europese telecommunicatieadministraties een voorstel in voor een voorlopig breedbandnetwerk op experimentele basis. Dit voorstel was gebaseerd op bereikte overeenstemming over de implementatie van EBIT (European Broadband Interconnection Trial) : transnationale aansluitingen van 2 Mb/s, geleidelijk opgevoerd tot 140 Mb/s. De grootste deelnemende netwerkexploitanten ondertekenden een beginselverklaring en er werd een multinationaal team samengesteld om advies en ondersteuning te geven aan de proefprojecten over hun eisen voor netwerk en software, om te zorgen voor de interoperabiliteit van eindgebruikerssystemen. Dit exploitatie- en ondersteuningsproject binnen het RACE-programma droeg bij aan de begeleiding van de verschillende "proefprojecten". Vanwege de moeilijkheden bij het realiseren van betaalbare transnationale koppelingen voor onderzoekswerkzaamheden hebben de meeste projecten zich tot op heden echter beperkt tot experimenten met nationale testsystemen. Pas in 1993 en 1994 wordt een transeuropese proef met breedband - met bandbreedte op aanvraag - financieel haalbaar, doordat er experimenteel met ATM-systemen kan worden gewerkt.

Desondanks hebben de experimentele applicaties beantwoord aan hun doel, namelijk het werk aan de ontwikkeling van technologie en specificaties feedback te geven uit reële gebruiksomgevingen.

2.5 De betrokkenheid van het MKB

Ondanks de hoge kosten van O&O op het gebied van geavanceerde telecommunicatie hebben aan de eerste fase van het RACE-programma veel ondernemingen uit het midden- en kleinbedrijf (MKB) deelgenomen. Zij vertegenwoordigden 28% van de deelnemers aan de RACE-projecten, aanzienlijk meer dan de 16,5% die aan het tweede Kaderprogramma in zijn geheel deelnam[11]. Kleine organisaties, zowel ondernemingen als onderzoeksinstituten, namen deel aan meer dan 60% van de projecten.

[11] Evaluatie van het tweede Kaderprogramma: verslag van CREST aan de Raad, september 1992. CREST/1212/1/92.

2.6 De bijdrage aan de economische en maatschappelijke samenhang

Door strategieën voor de invoering van IBC in alle regio's van de EG, inclusief de minder begunstigde regio's, te bestuderen en te ontwikkelen, heeft het programma de weg vrijgemaakt voor de verwezenlijking van transeuropese netwerken voor breedbandcommunicatie als voorzien in Titel XII van het Verdrag betreffende de Europese Unie. In het bijzonder is aandacht besteed aan de noodzaak om insulaire, niet aan zee grenzende en perifere regio's te verbinden met de centrale regio's van de Gemeenschap.

Een aanzienlijk aantal aanvullende maatregelen, colloquia en zomercursussen heeft ervoor gezorgd dat de uitgevoerde O&O-projecten toegankelijk waren voor wetenschappers en technici uit alle gebieden van de Europese Gemeenschap en er is in het bijzonder gestreefd naar de organisatie van colloquia en seminars in minder begunstigde gebieden. Een volledig overzicht van deze activiteiten wordt gegeven in bijlage I.

Bij 53 projecten (60%) waren organisaties uit minder begunstigde gebieden van de Gemeenschap betrokken; dankzij hun medewerking konden deze projecten bijdragen tot de overdracht van technologie en kennis aan deze regio's.

3. Evaluatie en audits van het RACE-programma

3.1 Evaluatie als een continu proces

Gezien de snelle ontwikkelingen op het gebied van communicatietechnologieën en -diensten is evaluatie steeds beschouwd als een continu proces dat plaats moest vinden gedurende de gehele voorbereiding en uitvoering van het programma. Het was ook een proces dat betrekking had op elk niveau: de strategische oriëntatie van het programma, het operationeel beheer van het programma en de technische koers van elk afzonderlijk project.

Het evaluatieproces is begonnen met de uitgebreide medewerking van de hele telecommunicatie-sector bij de planning van het programma en de samenstelling van het werkprogramma. Door middel van voortdurende samenwerking met industrie en telecommunicatie-exploitanten was het mogelijk zowel het totale werkprogramma als de werkprogramma's van alle projecten jaarlijks te actualiseren. Daarnaast was er dankzij regelmatige bijeenkomsten van de consortia die het programma uitvoerden (coördinatiebijeenkomsten) een continu informeel proces waarbij de voortgang van projecten werd gecontroleerd en de koers ervan werd bijgesteld. Op de samenhang van de werkzaamheden werd toegezien door het Consensus Management Project, dat intensieve contacten heeft ontwikkeld met Europese normalisatie-instanties.

Van de voortgang van de werkzaamheden werd in 1990 verslag gedaan aan de Raad en het Europese Parlement in de "evaluatie na 30 maanden" als omschreven in de Beschikking van de Raad.[12]

Dit eindrapport is opgesteld overeenkomstig artikel 9 van de Beschikking, waarin bepaald wordt dat de Commissie na afloop van de eerste periode van vijf jaar "na raadpleging van het [Beheers]comité, over het functioneren en de resultaten van het programma aan de Lid-Staten en het Europese Parlement een verslag doet toekomen". Dit rapport actualiseert en vervangt de in 1990 gepresenteerde evaluatie na 30 maanden.

Overeenkomstig artikel 6, lid 4, derde streepje, heeft de Commissie dit rapport ter goedkeuring voorgelegd aan het Beheerscomité.

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12 Dit verslag vormde de tenuitvoerlegging van artikel 9 van de Beschikking van de Raad waarin bepaald is: "Na 30 maanden wordt het programma opnieuw bezien aan de hand van een evaluatie van de resultaten die met betrekking tot de in bijlage II omschreven precieze doelstellingen zijn bereikt. De Commissie stelt de Raad en het Europese Parlement in kennis van de resultaten van deze evaluatie."

3.2 Audits en evaluaties van het programma

De in het kader van het RACE-programma uitgevoerde werkzaamheden inzake geïntegreerde breedbandcommunicatie (IBC) zijn periodiek aangepast om in te spelen op de snel veranderende technisch-economische omstandigheden en mogelijkheden qua dienstenaanbod. Daarom is binnen het programma jaarlijks een kritische beoordeling (audit) uitgevoerd ten aanzien van twee aspecten:

- **de strategische aspecten,** waarbij de resultaten van RACE als geheel aan de hand van de strategische en beleidsdoelstellingen van de Gemeenschap in een internationale context werden beoordeeld;

- **de technische aspecten,** waarbij de resultaten van de RACE-projecten aan de hand van de doelstellingen van RACE werden beoordeeld.

Tevens werd een audit van het **programmabeheer** uitgevoerd. Dit leverde een onafhankelijke beoordeling op van het functioneren van de diensten van de Commissie als verantwoordelijke voor het beheer van het programma.

3.2.1 Strategische audits en programma-evaluaties

In 1989 is een onafhankelijke strategische audit uitgevoerd om de werkzaamheden te evalueren aan de hand van de strategische en beleidsdoelstellingen van de Gemeenschap in een internationale context. De belangrijkste conclusies waren dat:

- de fundamentele doelstelling van RACE haar geldigheid behield: de ontwikkeling van IBC was passend en noodzakelijk voor Europa en 1995 als streefdatum kwam overeen met de eisen en met de ontwikkelingen op wereldschaal; en dat

- de nadruk die de verschillende bestreken gebieden in RACE kregen, passend was.

Het audit-team deed voorts de aanbeveling dat in de volgende fase meer aandacht besteed zou worden aan faciliteiten bij de gebruiker, mobiele applicaties, digitale HDTV en verificatie en testen, waarbij ATM als de sleuteltechnologie voor het netwerk beschouwd werd.

Overeenkomstig het subsidiariteitsbeginsel gaf de strategische audit bovendien aan welke acties buiten het RACE-programma om dienden te worden ondernomen door nationale overheidsinstellingen en door de partijen in de telecommunicatiesector om te zorgen dat de resultaten van het O&O gevolgd werden door een effectieve invoering van IBC. Deze aanbevelingen zijn weergegeven in tabel 4.

Aan enkele aanbevelingen is reeds gevolg gegeven: de aanbeveling aan telecommunicatieadministraties een beginselverklaring op te stellen aangaande nauwe samenwerking bij hun intraeuropese lange-afstandsverbindingen en -activiteiten is overgenomen in de beginselverklaring van METRAN en in de opzet van de GEN-overeenkomsten alsmede bij de oprichting van EURESCOM. De reikwijdte van het O&O werd vergroot, de normalisatie-inspanningen inzake ATM werden versterkt en momenteel is een experimentele invoering van ATM in ontwikkeling. Andere aanbevelingen hebben echter nog niet binnen het voorgestelde tijdschema tot resultaten geleid: binnen het kader van de regelgevingen in Europa bleek de bundeling van belangen van telecommunicatie-, omroep- en kabel-tv-administraties op de voorgestelde wijze niet mogelijk en de ontwikkeling van HDTV verliep langzamer dan voorzien.

De strategische audit werd in 1990 gevolgd door een toekomstgerichte bestudering van komende behoeften en mogelijkheden, waarbij door vooraanstaande deskundigen op het gebied van strategie, beleid en techniek werd samengewerkt. De aanbevelingen van deze "Requirements Board" zijn gedocumenteerd in het rapport "Telecom 2000" en hebben als uitgangspunt gediend bij het opstellen van het werkprogramma voor de tweede fase van RACE.

In 1991 en begin 1992 is het RACE-programma samen met de andere grote programma's voor IT- en telematica-applicaties van het tweede Kaderprogramma (ESPRIT en DRIVE) opnieuw geëvalueerd door een onafhankelijke werkgroep onder voorzitterschap van W. Dekker[13]. Op de aanbevelingen van deze werkgroep heeft de Commissie afzonderlijk gereageerd[14].

Aanbevelingen van de strategische audit-werkgroep in 1989

A) De nationale regeringen dienen samen te werken ten einde voor 1992 de voorwaarden en bepalingen vast te leggen welke van toepassing moeten zijn op de invoering van paneuropese geavanceerde communicatiediensten.

B) De telecommunicatie-, omroep- en kabel-tv-administraties moeten voor medio 1989 een voorstel doen voor een gecoördineerde aanpak van en een tijdschema voor de ontwikkeling en het gebruik van IBC-infrastructuren voor telecommunicatie- zowel als amusementsdiensten inclusief HDTV, waarbij, zo mogelijk, volledig profijt wordt getrokken van investerings-initiatieven van de particuliere sector.

C) De telecommunicatieadministraties moeten voor 1990 een voorlopige beginselverklaring opstellen inzake nauwere samenwerking bij hun intraeuropese lange-afstandsverbindingen en -activiteiten.

D) De aanbieders van diensten moeten voor eind 1990 een eerste reeks vereisten, commerciële voorwaarden en voorschriften specificeren die een snel en wijdverbreid gebruik van IBC-diensten ten goede kunnen komen.

E) De telecommunicatie-, omroep- en kabel-tv-administraties, de aanbieders van diensten en de telematica-industrie moeten voor medio 1989 overeenstemming bereiken over een beginselverklaring om het gezamenlijke O&O-werk van RACE aan te vullen met de experimentele implementatie van sommige IBC-diensten op Europese schaal met het oog op een eerste introductie van IBC voor het bedrijfsleven in 1992.

F) Het gezamenlijke O&O moet voor eind 1989 worden uitgebreid met Geïntegreerde Diensten Ontwerptechnologie, vaste en mobiele applicaties en technieken voor het verifiëren en testen van communicatieapparatuur en functies van diensten.

G) De Europese normalisatie-instanties moeten hun inspanningen opvoeren en coördineren om te komen tot internationale normalisatie voor IBC en geavanceerde diensten. Voor medio 1989 dient een tijdschema voor de normalisatie opgesteld te zijn, met name voor ATM.

H) De Lid-Staten dienen het probleem van de frequentietoewijzing in Europa over het geheel van frequenties en applicaties aan te pakken. Zij dienen voor 1992 een rationalisering van de frequentietoewijzingen mogelijk te maken waarin de veranderende behoeften en prioriteiten tot uiting komen.

13 Het rapport van het comité voor de evaluatie van informatie- encommunicatietechnologie, onder voorzitterschap van W. Dekker, juni 1992

14 Reactie van de Commissie op het rapport Dekker, januari 1993

In 1992, ten slotte, deed de Commissie verslag over het programma in de context van haar evaluatie van het tweede Kaderprogramma[15]. Het Comité voor wetenschap en technisch onderzoek (CREST) werd door de Raad verzocht het verslag van de Commissie te becommentariëren. Dit verzoek werd door CREST doorgegeven aan het Beheerscomité (RMC) van RACE dat in juli 1992 het volgende verslag uitbracht:

Kwaliteit van de resultaten en effecten op het concurrentievermogen

Algemeen gesteld kunnen de resultaten van RACE op zijn minst als state-of-the-art worden gekwalificeerd en er zijn vele voorbeelden van doorbraken te noemen (bijvoorbeeld de asynchrone transmissietechniek ATM, mobiele communicatie (UMTS: Universal Mobile Telecommunications System) en optische technologieën en apparatuur).

Europa verkeert nu in een sterkere positie dan zonder RACE het geval zou zijn geweest. Andere landen liggen misschien nog op Europa voor, maar de technologiekloof van de Europese telecommunicatie is aanzienlijk verkleind ten opzichte van zowel de VS als Japan.

In de vijf jaar van het Tweede Kaderprogramma heeft RACE zijn technische doelstellingen als omschreven in de Beschikking van de Raad grotendeels bereikt. De veranderingen in de telecommunicatiesector (bijvoorbeeld nieuwe eisen aan diensten, nieuwe technologieën, toenemende concurrentie tussen exploitanten) zijn echter zo snel gegaan dat de doelstellingen en prioriteiten van het programma zelf tijdens de looptijd van vijf jaar bijgesteld moesten worden. Er zijn aanvullende doelstellingen met nieuwe prioriteiten bijgekomen (bijvoorbeeld communicatie-experimenten en infrastructuren voor verificatie en testen), die opgenomen zijn in latere programma's, zoals RACE II (de tweede fase van het RACE-tienjarenprogramma).

Het RACE-programma was een stimulans voor de samenwerking tussen Openbare Netwerkexploitanten (PNO,s) (bij strategische planning zoals in EURESCOM), binnen het bedrijfsleven (bij de vorming van een industrieel consortium - RIC) en tussen PNOsen het bedrijfsleven (bijvoorbeeld in normalisatie-instanties als ETSI). Dit type samenwerking behoeft echter nog verdere ontwikkeling, zowel in omvang als in diepte.

Naast talrijke wetenschappelijke en technische resultaten heeft RACE I 470 bijdragen (per 6/92) aan normalisatie-instanties (hoofdzakelijk ETSI) opgeleverd, gebaseerd op het opstellen van de gemeenschappelijke functionele specificaties.

Dankzij de samenwerking binnen RACE is het concurrentievermogen van de telecommunicatie-industrie op de wereldmarkten toegenomen. Voor het Europese bedrijfsleven als geheel zal de positieve invloed van RACE op langere termijn zichtbaarder worden naarmate de geavanceerde communicatie op grotere schaal ingang vindt. Verder O&O op het gebied van applicaties kan aan de potentiële gebruikers duidelijk maken dat zij een concurrentievoordeel kunnen bereiken door middel van ultramoderne communicatie.

15 **Mededeling van de Commissie inzake "Evaluatie van het Zweede Kaderprogramma voor onderzoek entechnologische ontwikkeling" (SEC(92)675 def.), juli 1992**

Beheer en rentabiliteit

Binnen het Kaderprogramma vormt RACE een samenhangend programma met doelstellingen die voor alle projecten gelden en een totale tijdsduur van tien jaar. Tijdens RACE I is de meeste vooruitgang geboekt op het gebied van ATM, optische componenten en technologieën, mobiele communicatie (UMTS) en breedbandexperimenten. Als gevolg hiervan kwam in RACE II de nadruk veel sterker te liggen op de twee laatstgenoemde categorieën. De gebieden waar minder vooruitgang plaats vond, zijn onder meer beveiliging en gebruikersvriendelijkontwerpen: de oorspronkelijke doelstellingen hiervoor moesten naar beneden bijgesteld worden.

De spil van de binnen RACE gerealiseerde samenwerking wordt gevormd door het overlegmechanisme (concertation). Een heel Europa omspannende samenwerking als bij RACE is rendabel omdat deze leidt tot een vermenigvuldigingsfactor in de resultaten die de partners realiseren ten opzichte van hun afzonderlijke investeringen.

De procedures voor het beoordelen van inschrijvingen en voor de technische audits functioneerden goed. De "rode vlag"-procedure zorgde bijvoorbeeld voor een geslaagde bijsturing en stimulering van projecten waarvan de doelstellingen anders niet gehaald zouden zijn, of leidde soms tot het vroegtijdig stopzetten van projecten om verspilling van middelen te voorkomen.

Ook al is het programma over het algemeen goed gestructureerd en wordt het goed beheerd, er zijn toch enkele punten aan te wijzen waar verbetering mogelijk is:

- De samenwerking met andere Europese multinationale onderzoeksprogramma's was niet effectief genoeg.

- De Commissie, de Openbare-netwerkexploitantenen het bedrijfsleven dienen zich tegenover elkaar te verbinden tot steun aan het programma en zijn doelstellingen alvorens het werkprogramma goedgekeurd wordt.

- Er zijn meer inspanningen nodig om de kwaliteit van het programma als geheel, los van de projecten die er deel van uitmaken, op peil te houden. Bijvoorbeeld: te veel belangrijke deelnemers blijven niet tijdens de gehele looptijd zelf bij het programma betrokken.

- De rentabiliteit van de Concertation Meetings moet geoptimaliseerd worden.

- Het Consensus Management Project dient bij voorkeur het eerst geëntameerde project te zijn zodat doelmatige betrekkingen met andere projecten kunnen worden gewaarborgd.

- Er zijn maatregelen nodig om de actieve rol en deelname van het MKB in toekomstige programma's te vergroten.

- Er dient meer gebruik gemaakt te worden van gezamenlijke acties en ondersteunende maatregelen.

Overeenstemming met EG-beleidslijnen en beginselen

De technische selectiecriteria die gehanteerd zijn bij het beoordelen van inschrijvingen en het auditen van projecten, zijn bevredigend gebleken.

Bij de selectie van projecten voor RACE I is niet expliciet rekening gehouden met maatschappelijke en economische criteria. In het algemeen gesproken is een telecommunicatieprogramma als RACE echter in overeenstemming met het gevoerde beleid inzake milieu en energiebesparing.

Voor wat de subsidiariteit betreft is het duidelijk dat samenwerking op Europees niveau bij prenormatief onderzoek op het gebied van telecommunicatie veel voordelen kan opleveren. Ook de interactie met nationale programma's en experimenten dient echter bevorderd te worden.

Conclusies

1995 kan niet het eindpunt zijn van de onderzoeksprogramma's op telecommunicatiegebied in Europa. Na RACE moet er een nieuw programma komen.

Onderzoek en ontwikkeling zijn noodzakelijk maar niet voldoende om een goede positie op de toekomstige telecommunicatiemarkten te veroveren. Het Beheerscomité geeft in dit document niet aan welke andere maatregelen nodig zijn om dat resultaat te bereiken. De accentverschuiving bij telecommunicatie-O&O naar diensten en applicaties moet van invloed zijn op structuur en organisatie van de toekomstige programma's.

De resultaten van RACE dienen in Europa op grotere schaal opgepakt en benut te worden. De noodzakelijke initiatieven om deze overdracht te bereiken zullen mogelijkerwijs genomen moeten worden door de betrokkenen in de sector zelf.

Onder andere op basis van dit rapport bracht het CREST in oktober 1992 verslag uit aan de Raad inzake het tweede Kaderprogramma.

3.2.2 Effectbeoordeling en prognoses

De ontwikkeling van onderzoek en technologie in het kader van het programma is gedurende deze vijf jaar vergezeld gegaan van regelmatige beoordelingen van de economische en sociale effecten van de ontwikkelingen in de geavanceerde communicatie. De verslagen van deze beoordelingen zijn gepubliceerd en hebben een ruime verspreiding gekregen in de rapportenreeks "Perspectives for Advanced Communications in Europe: PACE". De jongste van deze beoordelingen is uitgevoerd in 1991 en verspreid in 1992. Deze activiteit verschaft de feitenachtergrond voor de jaarlijkse bijstelling van de programmawerkzaamheden alsmede voor kleine aanpassingen in de loop van het jaar. Voor het grootste deel is deze activiteit thans geheel geïntegreerd in de tweede fase van RACE overeenkomstig de bepalingen van het besluit van de Raad betreffende het specifieke programma op het gebied van communicatietechnologie.

3.2.3 Audit van het programmabeheer

In 1989 zijn de door de diensten van de Commissie gekozen procedures voor het beheer van het RACE-programma onderworpen aan een onafhankelijke "audit van het programmabeheer".

De voornaamste conclusies hielden in dat de door de diensten van de Commissie gekozen bedrijfsmatige wijze van programmabeheer in het algemeen passend was voor de doelstellingen van het programma en de deelnemers eraan en dat de jaarlijkse technische audits en de periodieke coördinatiebijeenkomsten een effectieve aanpak bleken te zijn van het programmabeheer.

3.2.4 Technische audits van RACE-projecten

Ten einde het programma te kunnen aanpassen aan de ontwikkeling van de technologie en de veranderingen in de waargenomen vraag, voorziet de RACE-beschikking in een jaarlijkse herziening van het werkprogramma.

Dit betekende dat de voortgang van alle lopende projecten elk jaar moest worden beoordeeld aan de hand van de doelstellingen en tevens in het licht van nieuwe behoeften. Daarom is elk project jaarlijks onderworpen aan een "technische audit" door onafhankelijke deskundigen op het desbetreffende onderzoeksterrein. De eerste technische audit vond plaats in oktober 1988 en de laatste in oktober 1992. De resultaten van deze technische audits zijn benut om de werkzaamheden aan projecten bij te sturen of, indien noodzakelijk, stop te zetten.

De technische audits bestonden uit de volgende hoofdonderdelen:

(a) Elk jaar verrichtten de partners in elk project een "zelfbeoordeling" door het project te beoordelen in al zijn essentiële aspecten en de resultaten vast te leggen in een jaarlijks beoordelingsrapport.

(b) Deze rapporten werden vervolgens geëvalueerd door onafhankelijke deskundigen (auditors) die gevonden werden met hulp van het Beheerscomité. Na de evaluatie van de rapporten vond per project een "hearing" plaats onder voorzitterschap van de Commissie. De projecten werden in de gelegenheid gesteld de bereikte resultaten toe te lichten en komende werkzaamheden te schetsen. De auditors, verenigd in werkgroepen naar gelang hun specialisme, konden vragen stellen over de projecten om het uit het jaarlijkse rapport en de presentatie gerezen beeld aan te vullen.

(c) Binnen de werkgroepen werden conclusies en aanbevelingen samengevoegd en vastgelegd in audit-werkgroeprapporten aan het Beheerscomité en de Commissie.

(d) De auditrapporten werden aangevuld met een beoordeling van de contractuele "deliverables" verricht door de projectambtenaren van de Commissie (in het algemeen worden de "deliverables" als vertrouwelijk beschouwd en niet aan de auditors bekend gemaakt).

Deze werkwijze bleek zowel eerlijk als doeltreffend. Elk jaar vormden de auditrapporten een uitstekende basis bij het onderhandelen over contracten voor de gedetailleerde werkprogramma's van elk project.

4. Relaties met andere acties in EG- en Europees verband

4.1 Relaties met de CEPT

De relaties met de CEPT en onder de CEPT ressorterende instanties zijn tijdens de ontwikkeling en de uitvoering van RACE sterk veranderd.

In de definitiefase leverde de door de CEPT ingestelde speciale werkgroep voor breedbandcommunicatie (GSLB) een grote bijdrage aan het werkprogramma van fase I van RACE. In 1987 en 1988 werd de coördinatie met het werk van de CEPT verzorgd door de gemeenschappelijk groep (GMR) die speciaal voor dit doel in september 1987 was opgericht.

In 1988 leidde de samenwerking met de CEPT voorts tot de ondertekening door dertien Europese telecommunicatieadministraties van een beginselverklaring met het oog op de invoering van een algemeen testsysteem voor IBC-werkzaamheden (EBIT).

De vernieuwing van de telecommunicatievoorschriften overeenkomstig het nieuwe Europese telecommunicatiebeleid was voor de CEPT aanleiding een aantal afzonderlijke instanties op te richten waarvan er twee nauwe banden met de RACE-activiteiten zijn aangegaan: de ETNO-groep (European Telecommunications Network Operators) is het forum geworden voor gesprekken tussen netwerkexploitanten over onderwerpen aangaande de interoperabiliteit van netwerken; EURESCOM vormt een platform voor gemeenschappelijk strategisch onderzoek. Hoewel niet alle grote Europese Openbare Netwerkexploitanten deelnemen aan EURESCOM, vormt deze instantie een waardevol ontmoetingspunt tussen de Commissie, RACE-projecten en de meeste netwerkexploitanten.

4.2 Relaties met Europese en internationale normalisatie-instanties

Het ETSI (European Telecommunications Standardisation Institute) is in 1988 opgericht als onderdeel van de tenuitvoerlegging van het Europese telecommunicatiebeleid. Thans fungeert het als het belangrijkste Europese forum voor de ontwikkeling van technische specificaties. De prenormatieve werkzaamheden van RACE hebben 576 verschillende bijdragen aan het normalisatiewerk van ETSI, CCITT en CCIR opgeleverd.

Tevens hebben regelmatig bijeenkomsten plaatsgevonden met vertegenwoordigers van CEN/CEN-ELEC, EBU en SPAG.

4.3 Relaties met andere communautaire programma's en Europese activiteiten

Bij de RACE-projecten wordt veel gebruik gemaakt van de resultaten van projecten waarin algemene technologieën ontwikkeld worden, zoals ESPRIT (componenten voor micro-elektronica, software-hulpmiddelen, AIP voor netwerkbeheer, enz.). Anderzijds wordt voor de telecommunicatiebehoefte van de applicatieprogramma's (DRIVE, DELTA en AIM) intensief gebruik gemaakt van technieken die in de lopende RACE-projecten worden ontwikkeld.

De samenwerking met COST vindt plaats in de vorm van nauwe contacten tussen projecten met verwante werkzaamheden en periodieke bijeenkomsten op het niveau van het programmabeheer.

Met het EUREKA-initiatief is de samenwerking het sterkst op het gebied van audiovisuele technologie. Een gedeelte van de werkzaamheden voor de bevordering van HDTV (EUREKA-project 95) is aangevuld met werkzaamheden van een RACE-project; EUREKA-project 256 inzake videocodering is gekoppeld aan de integratie-werkzaamheden van RACE.

4.4. *Relaties met organisaties in EVA-landen*

Organisaties uit Oostenrijk, Finland, Noorwegen, Zweden en Zwitserland zijn betrokken bij RACE. 27 organisaties uit deze landen hebben deelgenomen aan 72 projecten (betrekking hebbend op ruim 80% van de werkzaamheden).

5. De benutting van de resultaten van RACE

De kansen die door de nieuwe communicatietechnologieën worden geboden, zullen in de toekomst ingrijpende gevolgen hebben voor de economische groei en de internationale arbeidsverdeling op wereldschaal. Er doen zich drie afzonderlijke maar onderling samenhangende groeiprocessen voor:

- Verbeterde toegang tot betere informatie leidt tot hogere produktiviteit in de economie als geheel.

- Verbeteringen in de communicatie verhogen de bruikbaarheid en derhalve de verkoopbaarheid van oude zowel als nieuwe diensten, zodat deze zich kunnen uitbreiden.

- Overgang naar de nieuwe, door diensten gedreven en op informatie gebaseerde economie vereist zeer grote investeringen van overheid en particulieren in nieuwe, zowel fysieke (kabels, schakelingen, terminals) als menselijke infrastructuren om te komen tot de ontwikkeling van telecommunicatiediensten met een toegevoegde waarde.

De kwaliteit - zowel technisch als organisatorisch - zal derhalve van cruciaal belang zijn voor economische groei in de toekomst, aangezien deze bepalend is voor het vermogen van de economie om de belangrijkste factor van de moderne "produktie", kennis, voort te brengen en efficiënt te gebruiken. De geografische organisatie van de infrastructuren zal, net als de spoorwegen in de 19de eeuw, invloed hebben op het sociale, economische en culturele leven van morgen.

Om die redenen moeten de resultaten van O&O op communicatiegebied snel en efficiënt benut worden. Daarom verdient het benutten van alle bij het RACE-programma behaalde resultaten bijzondere aandacht.

5.1 Het RACE-benuttingsplan

Ten einde de benutting van de RACE-resultaten door de deelnemers te stimuleren en te meten is van 1988 tot 1992 een regelmatig bijgesteld "RACE-benuttingsplan" gehanteerd. Het verschaft een totaalbeeld van het gebruik van de resultaten door de deelnemers.

De bijdragen aan de normalisatie zijn vermeld in bijlage II en de titels van de wetenschappelijke en technische publikaties in bijlage III. Gezien de ruim 1700 wetenschappelijke en technische publikaties die uit de werkzaamheden zijn voortgevloeid, heeft het RACE-programma een belangrijke bijdrage geleverd aan de vrij toegankelijke wetenschappelijke literatuur.

Voorts zijn waar nodig de resultaten van de technologieontwikkeling beschermd door middel van octrooien. Inmiddels zijn 73 octrooien geregistreerd die verband houden met RACE-werkzaamheden. Deze staan vermeld in bijlage IV.

5.2 Planning voor de invoering van IBC

Een doeltreffende benutting van O&O is slechts mogelijk wanneer alle partijen een samenhangende visie hebben op de koers en het tempo van de commerciële ontwikkelingen. Daarom is het O&O van RACE steeds gepland en gespecificeerd aan de hand van een indicatief plan voor de invoering van geïntegreerde breedbandcommunicatie dat regelmatig geactualiseerd werd. Dit plan behelst de stapsgewijze invoering van geavanceerde diensten, te beginnen met die waarnaar al in 1992/1993 in bedrijfs- en beroepskringen vraag bestaat. Het huidige indicatieve invoeringsschema als beschreven in het RACE-jaarrapport voor 1992 (RACE'92) bevat de volgende mijlpalen:

1992/1993:

- introductie van de eerste applicaties voor zakelijk en beroepsmatig gebruik;
- geavanceerde communicatie-experimenten om nieuwe diensten en systemen voor netwerkbeheer te testen: ATM, MAN en IBC in bij de gebruiker geïnstalleerde netwerken
- beslissingen aangaande aankopen/investeringen voor toekomstige paneuropese IBCN en volledige IBC-diensten;
- afronding van de voornaamste normen.

1994:

- voltooiing van de verbinding van alle EG-hoofdsteden onderling zowel als met de buurlanden op basis van uitbreiding van bestaande optische-kabelnetwerken, maar wel geschikt voor stem-, gegevens- en beeldverkeer, hetzij afzonderlijk hetzij in de vorm van geïntegreerde diensten.

1995:

- eerste implementatie van een IBC-netwerk met toegang voor de zakelijke klant in economische en fabricagecentra. Ten minste 50.000 bedrijven als gebruikers van geavanceerde diensten;
- praktijkexperimenten met applicaties om een volledig scala IBC-diensten te testen (inclusief woningen met tweerichtingsvideo en digitale HDTV) met gebruikmaking van commerciële IBC-apparatuur.

1996:

- aanbod van fundamentele commerciële diensten op breedband gebaseerd op 2, 34 en 155 MBit/s-verbindingen met inbegrip van snelle gegevensoverdracht tussen lokale netwerken, desk-top videovergaderingen, video-processing, CAD/CAM en telewerkapplicaties;
- interoperabiliteit van vaste breedbandnetwerken met mobiele, satelliet- en andere netwerken.

1997:

- beschikbaarheid van IBC-diensten voor zakelijke gebruikers in steden met meer dan 500.000 inwoners en begin van de implementatie op grote schaal van een glasvezelkabelnet naar woningen.

2005-2010:

- penetratiegraad van IBC-diensten : 50%.

Dit indicatieve tijdschema zal in 1993 opnieuw worden herzien in de context van de voorbereiding van een richtlijn voor de ontwikkeling van transeuropese breedbandnetwerken als voorzien in Titel XII, artikel 129b en 129c van het Verdrag betreffende de Europese Unie

6. De uitvoering van fase II van RACE

Het RACE-programma is steeds opgezet als een werkplan van tien jaar dat in twee fasen uitgevoerd zou worden. Met het oog op de continuïteit is de tweede fase in juni 1991 goedgekeurd als een specifiek programma binnen het derde EG-Kaderprogramma voor onderzoek en technologische ontwikkeling.

In 1991 bleek zich echter een belangrijke verschuiving in de zienswijze te hebben voltrokken. Wat in het beginstadium van het programma een ambitieuze, bijna futuristische visie leek was uitgegroeid tot een reële mogelijkheid. De commerciële introductie van geïntegreerde breedbandcommunicatie werd nu binnen vier jaar met vertrouwen tegemoet gezien. Tevens was het nog duidelijker geworden dat telecommunicatie en geavanceerde informatiediensten een sleutelrol zouden gaan spelen in de sociaal-economische ontwikkeling van de wereld op de drempel van de 21ste eeuw.

Deze veranderingen brachten het Europees Parlement en de Raad ertoe prioriteit te verlenen aan de goedkeuring van het nieuwe specifieke programma. Dit was het eerste dat uit hoofde van het Derde Kaderprogramma werd goedgekeurd[16] en het werkprogramma ervan ontving onmiddellijk een gunstig advies van het Beheerscomité. In juni 1991 werd een uitnodiging voor het indienen van voorstellen gepubliceerd; deze zijn in september en oktober 1991 beoordeeld. Meer dan 200 voorstellen werden behandeld en begin 1992 werd het werk aan 95 projecten gestart. Het werk hieraan moet bij de huidige begrotingsmiddelen eind 1994 voltooid zijn.

Ging bij de projecten van fase I van RACE de aandacht vooral uit naar het beoordelen van keuzemogelijkheden, die van fase II vormen de voorbereiding op de introductie van IBC. De RACE II-projecten houden een intensivering in van de samenwerking en de verplichtingen die de zakelijke gebruikers, de telematica-industrie en de telecommunicatie-exploitanten reeds tijdens RACE I zijn aangegaan. Het nieuwe O&O richt zich vooral op applicaties, diensten, exploitatie en beheer maar behoudt ook een aanzienlijke hoeveelheid technologie-ontwikkeling ten einde de cruciale gebieden die noodzakelijk zijn voor het verwezenlijken van een rendabel aanbod van IBC-diensten, te consolideren en uit te breiden.

De werkzaamheden omvatten de acht in de bijlage van de Beschikking van de Raad genoemde prioritaire gebieden :

GEBIED 1 O&O voor IBC (geïntegreerde breedbandcommunicatie)
GEBIED 2 intelligentie in netwerken/flexibel beheer van communicatiemiddelen
GEBIED 3 mobiele en persoonlijke communicatie
GEBIED 4 beeld- en gegevenscommunicatie
GEBIED 5 technologie voor geïntegreerde diensten
GEBIED 6 informatiebeveiligingstechnologie
GEBIED 7 experimenten met geavanceerde communicatie
GEBIED 8 infrastructuren voor proeven en "interworking" (een horizontaal O&O-gebied tot ondersteuning van de andere prioriteitsgebieden).

Een volledige beschrijving van de nieuwe O&O-projecten van fase II en de wijze waarop deze gerelateerd zijn aan de projecten van fase I is te vinden in de jaarverslagen over 1992 (RACE '92) en 1993 (RACE '93).

[16] Raadsbesluit 91/352/CEE of 7 Juni 1991: PB L 192/8, 16.7.91

7. Toekomstige eisen en mogelijkheden voor O&O op het gebied van communicatietechnologieën op Europees niveau

In juni 1992 is door het Beheerscomité van RACE een ad hoc werkgroep ingesteld om prioriteiten vast te stellen voor toekomstig Europees O&O op het gebied van telecommunicatie. Het verslag van deze groep volgt hierna.

Veel van deze ideeën en thema's voor toekomstig communautair O&O zijn reeds vervat in het werkdocument van de Commissie inzake het vierde Kaderprogramma, met name in de voorstellen voor de onderwerpen "beeldtechnologieën", "krachtige computers en netwerken", "functionele integratie bij fabricage" en "geavanceerde communicatie". De Commissie zal in 1993, na bestudering van alle bijdragen, haar voorstellen voor specifieke programma's onder het vierde Kaderprogramma bekendmaken.

Waarom O&O op Gemeenschapsniveau?

Het Beheerscomité blijft van mening dat er duidelijke voordelen en winstpunten gelegen zijn in het verrichten van telecommunicatie-O&O op Gemeenschapsniveau. Globaal gesproken is onderzoek (met name onderzoek op telecommunicatiegebied) een continu proces. Om de positieverbetering in stand te houden die de betrokkenen in de sector via hun deelname aan EG-acties als RACE reeds bereikt hebben, zal hun gezamenlijke onderzoeksinspanning moeten worden voortgezet en moeten zij voortbouwen op de tot dusver behaalde resultaten.

Een verdere consolidatie van de versnipperde telecommunicatiesystemen van de Gemeenschap is noodzakelijk, zowel om ervoor te zorgen dat de Interne Markt doelmatig functioneert als om de concurrentiepositie van Europese organisaties op de wereldmarkten te versterken. Bij normalisatie-instanties als het ETSI is waardering ontstaan voor de technische bijdragen die men als direct resultaat van de RACE-werkzaamheden ontving. Het proces van het "beheren van de stroom" van resultaten voortvloeiend uit communautair O&O naar normalisatie-instanties dient te worden voortgezet en zelfs versterkt in het kader van verdere programma's.

Geavanceerde telecommunicatie is in toenemende mate van belang voor de gezondheid van de nationale economieën, zodanig zelfs dat de bouwstenen ervan ("informatie" en het vermogen deze door te geven) beschouwd worden als strategische middelen. Dit is te meten aan de hand van:

- het groeiend aandeel van telecommunicatie-investeringen in de nationale economien; en

- de groeiende effecten van geavanceerde telecommunicatiediensten op andere sectoren van economische bedrijvigheid.

Deze trends hebben erkenning gevonden zowel in de Europese Akte als in de huidige inspanningen om de interne markt van de Europese Gemeenschap tot voltooiing te brengen. Het Verdrag van Maastricht voorziet in de totstandbrenging van transeuropese netwerken (waaronder telecommunicatienetwerken). Voor de verwezenlijking op Europees niveau van telecommunicatie-infrastructuren en -diensten is betrokkenheid op lange termijn van alle partijen in deze sector vereist.

Synchronisatie van de ontwikkelingen (eveneens op Europees niveau), met als doel te komen tot een infrastructuur voor breedbandcommunicatie, biedt een duidelijk economisch voordeel, zodat de gedane investeringen rendement opleveren. Deze synchronisatie zal ook het starten van nieuwe applicaties in alle Europese regio's vergemakkelijken en zal het mogelijk maken snel de kritische massa te bereiken die nodig is voor een blijvende groei van het gebruik van geavanceerde diensten. Het lijdt geen twijfel dat telecommunicatienetwerken en een groeiend aantal Gemeenschapsdiensten steeds internationaler van aard worden. Ook de bredere samenwerking buiten de Europese regio's kan worden bevorderd.

Om deze redenen is het Beheerscomité van mening dat een specifieke O&O-actie van de Gemeenschap op telecommunicatiegebied deel zou moeten uitmaken van elk toekomstig kaderprogramma. Er moet voortgebouwd worden op de stevige basis die door de eerdere programma's is gelegd. De aard van het telecommunicatie-O&O dat na 1995 nodig is, verschilt qua accenten echter sterk van het tot nu toe in het kader van RACE verrichte O&O.

Doelstellingen van toekomstig O&O op telecommunicatiegebied

Om de visie op geavanceerde communicatie te realiseren waarbij "iedereen met iedereen waar dan ook en wanneer dan ook kan communiceren via tekst, geluid en beelden" is het noodzakelijk dat Europa nieuwe O&O-initiatieven neemt.

Bestaande programma's als RACE en ESPRIT hebben al een belangrijke bijdrage geleverd aan de fundamentele technische haalbaarheid van deze visie. De drijvende kracht achter een nieuw EG-programma voor telecommunicatie-O&O moet thans komen van de behoefte aan applicaties. In principe moeten deze ook bepalend zijn voor de benodigde acties en de prioriteiten bij verder onderzoek naar fundamentele ondersteunende technologien.

Daaruit volgt dat elk nieuw programma uit moet gaan van de volgende tweeledige doelstelling:

- het bevorderen van "praktijkexperimenten" met geavanceerde diensten om de bruikbaarheid ervan te verbeteren en te zorgen dat het eindresultaat aantrekkelijk genoeg is voor algemeen gebruik in het dagelijks leven van de Europeanen;

- verder onderzoek doen naar de "technologieën van de toekomst" die nodig zijn om de geavanceerde communicatie te ondersteunen, om de kosten in economische zin van de sleutelcomponenten omlaag te brengen en daardoor de levering van geavanceerde diensten beter haalbaar te maken.

Deze twee punten zijn vooral van belang voor de paneuropese commerciële verwezenlijking van netwerken en diensten op het gebied van geavanceerde communicatie, ook al is deze verwezenlijking nog van een aantal andere factoren afhankelijk. Om te komen tot de verwezenlijking van deze visie op geavanceerde communicatie is het nodig verder te bouwen op het groeiend onderling overleg van de betrokkenen in de sector zodat er een consensus komt omtrent:

- de beste manier om de noodzakelijke verhoging van de prestaties van de diensten en de bijbehorende ondersteunende technologieën te bereiken;

- de beoogde kansen, voortvloeiend uit de convergentie van telecommunicatie-, omroep- en informatietechnologie, waarop een snelle evolutie naar geavanceerde communicatie gebaseerd kan worden.

Kortom: voortzetting van het gemeenschappelijk O&O op het gebied van geavanceerde communicatie zal op zichzelf al een bevordering inhouden van de Europese samenwerking en harmonisatie. Dit zal leiden tot een versterking van het Europees concurrentievermogen op de internationale markten en daardoor tot versterking van de Europese economie als geheel.

Basis voor samenwerking (modus operandi)

Om de algemene aantrekkelijkheid van geavanceerde communicatie te ontwikkelen en de technologien beter "economisch haalbaar" te maken is het noodzakelijk alle belanghebbende partijen erbij te betrekken: gebruikers, netwerkexploitanten, aanbieders van diensten, industrie, onderzoekscentra en universiteiten. De betrokkenheid van al deze partijen in de sector moet vanaf het begin gewaarborgd worden door hen te betrekken bij de opstelling van een werkprogramma. Vooral de actieve medewerking van exploitanten van openbare netwerken (PNO's) dient aangemoedigd te worden ten einde te kunnen profiteren van bestaande of geplande infrastructuren.

In het volgende O&O-programma moet een grotere rol zijn weggelegd voor het MKB, waar veel waardevolle deskundigheid aanwezig is met betrekking tot de ontwikkeling van applicaties en diensten. Deze deskundigheid is vitaal voor de behoeften van de Gemeenschap bij het betreden van dit nieuwe gebied van onderzoek. Uit de noodzaak de rol van het MKB bij toekomstig communicatie-O&O te versterken volgt de gedachte dat specifieke maatregelen moeten worden genomen om actieve MKB-deelname verder te vergemakkelijken. Zo kan het nodig zijn dat de Commissie van meer ondersteunende contractuele procedures gebruik maakt (bijvoorbeeld het CRAFT-mechanisme dat gebruikt is bij BRITE/EURAM of andere oorspronkelijke procedures).

Hoewel RACE over het algemeen een succes was, zouden enkele nieuwe procedures of verbeteringen van bestaande procedures moeten worden overwogen voor het beheer van het volgende O&O-programma voor communicatie. De afzonderlijke projecten moeten worden geformuleerd binnen een duidelijk gestructureerd kader, dat in het werkprogramma is vastgelegd en ze moeten specifiek gericht zijn op het bereiken van programmadoelstellingen. Ook het bij RACE met succes gehanteerde overlegmechanisme behoeft versterking.

Meer coördinatie tussen EG-programma's, betere samenwerking met andere Europese of multinationale onderzoeksprogramma's, grotere interactie met nationale programma's en experimenten - dit alles dient waar mogelijk te worden aangemoedigd. Gezamenlijke acties met EUREKA, COST en andere projecten op nationaal niveau zijn eveneens te overwegen.

De ondersteunende maatregelen van het programma moeten onder meer inhouden: passende bekendmaking van de projecten tijdens de uitvoering en promotie van de resultaten (alsmede mogelijke voordelen/applicaties van die resultaten) naar alle partijen in de sector toe, in het bijzonder potentiële gebruikers van geavanceerde communicatie.

Praktijkexperimenten en de ontwikkeling van diensten

Bij de introductie van nieuwe netwerktechnologieën en -diensten heeft de ervaring geleerd dat de ontwikkeling en implementatie van nieuwe applicaties een goed georganiseerde, aan de invoering voorafgaande en praktijkgerichte validering vereist (gebruikstests) waarbij alle partijen in de sector betrokken zijn. De echte uitdaging voor deze komende generaties van Europese praktijktests is er dus in gelegen, te laten zien dat er middelen en manieren zijn om (in een vrije markt) potentiële diensten te bundelen ten einde aan de behoeften van vitale marktsectoren tegemoet te komen.

Het O&O ten aanzien van praktijktests en de ontwikkeling van diensten moet zich concentreren op algemene punten waaruit geavanceerde diensten kunnen voortkomen. Hoewel de tests gebaseerd zijn op bestaande technologie, moeten ze geschikte nieuwe applicaties aangeven naarmate de netwerken intelligenter en de diensten flexibeler worden. Een van de hoofddoelstellingen van de praktijktests moet zijn het formuleren en bijdragen van voorstellen aan het normalisatieproces alsmede voorstellen voor platforms waar alle standpunten over de sectorapplicatie samenkomen:

- de onderneming (waaronder organisatie, interactie, informatie aan de gebruiker, management- en beveiligingsbeleid, kosten/baten-analyse, juridische, ethische en sociale invalshoeken)

- de informatie als zodanig (waaronder definiëring van de informatie-onderdelen, kwaliteit daarvan, informatiestroom en aanbieding aan de gebruikers)

- de telematica-functies (waaronder communicatie- en verwerkingsfuncties, soorten van dataweergave)

- de technologieën (waaronder apparatuur en programmatuur).

Op deze manier moet in de praktijktests aandacht worden besteed aan wetgeving, management- en beveiligingsbeleid, gebruikerstoegang en mens/machine-interfaces en moeten de tests tevens leiden tot kosten/baten-analyses en definities van de informatiekwaliteit.

De ontwikkeling van algemene diensten vergt gereedschappen voor het creëren van die diensten, het inbouwen van multimedia-telediensten en -terminals en het aanbieden van geavanceerde faciliteiten voor diensten alsmede het beheer en de constructie ervan. Toekomstige applicaties moeten dus aan de volgende vereisten voldoen:

- aanwezigheid van voor de sector specifieke definities, bepaald door aanbieders en gebruikers;

- gebaseerd zijn op algemene diensten en voldoen aan de eis van open netwerken;

- gedefinieerd zijn aan de hand van duidelijke kosten/baten-doelstellingen;

- een internationaal marktpotentieel hebben;

- de mogelijkheid hebben snel op nieuwe behoeften in te spelen zoals persoonlijke mobiliteit en ubiquiteit, breedband-multimediadiensten, gezamenlijk of intelligent netwerkgebruik.

Een empirische basis voor het kiezen van deze applicaties kan gevonden worden in lopende nationale en CEG-programma's (bijvoorbeeld RACE, telematicasystemen en ESPRIT). Het belangrijkste aandachtspunt voor toekomstige O&O-programma's moet zijn: voorafgaand aan de operationele fase praktijktests verrichten en de Europese validiteit van applicaties aantonen. Om beter tegemoet te komen aan de gebruikersbehoeften moeten naar de mening van het Beheerscomité de volgende "ontwikkelingen van diensten" opgenomen worden in een komend O&O-programma:

- uitbreiding van video-vergaderfaciliteiten en interactieve multimediadiensten;

- telewerken en "virtual presence";

- mobiliteit, ubiquiteit en informatiebeveiliging;

- smal-/breedbanddiensten;

- dienstenbeheer en intelligente netwerkdiensten.

Onderzoek naar ondersteunende technologieën

Elk nieuw programma voor telecommunicatie-onderzoek dient voort te bouwen op de aanzienlijke, bij eerdere programma's gelegde technologische basis. Thans is strategisch onderzoek nodig om kostenvoordeel te kunnen behalen uit technologieën van de volgende generatie. De doelstellingen daarvoor kunnen globaal als volgt worden geformuleerd:

- het aanbieden van de technologieën die nodig zijn voor de ontwikkeling van rendabele netwerken en diensten in Europa met een voorsprong op de concurrerende economische blokken ten einde een belangrijke bijdrage te leveren aan de versterking van de Europese economie;

- het scheppen van de basis voor een technisch haalbare en economisch aanvaardbare ontwikkeling van het telecommunicatienetwerk, eveneens met het doel (ten aanzien van de normalisatie) de Europese economie te versterken.

De uit deze algemene onderzoeksgebieden verkregen kennis kan wijziging nodig maken van de doelstellingen en prioriteiten van andere delen van het programma. De ontwikkeling van de dienstentechnologie zou, bijvoorbeeld, nieuwe input kunnen leveren voor onderzoek inzake componenten en netwerktechnologie. Het hoofdaccent moet echter ook in de toekomst gelegd worden op de nieuwe diensten die via het telecommunicatienetwerk aan de gebruikers kunnen worden geleverd. Aangezien een hoge mate van individualisering een van de kenmerken zal vormen van deze diensten, is interactie binnen een gesloten circuit tussen de evolutie van het netwerk en de ontwikkeling van de diensten vereist. Naar de mening van het BeheerscomitÕ moeten de volgende specifieke onderzoeksterreinen deel uitmaken van een toekomstig programma:

Evolutie van het netwerk om de basis te leggen voor een technisch haalbare en economisch aanvaardbare geavanceerde communicatie

- integratie van bestaande en nieuwe transmissiemedia en -systemen (koperen kabels, optische vezels, etherradio, satellieten), ook in distributie- en toegangsnetwerken (vezel in het lokaal circuit, enzovoort); integratie van mobiele en vaste netwerken;
- ontwikkeling van beheerde transmissiehiërarchieën en betere systemen voor netwerkbeheer
- optische transmissiesystemen met zeer hoge capaciteit en fotonische netwerkarchitecturen
- beheerde nodes voor B-ISDN (ATM) en uitgebreide signaaltransmissie;
- geavanceerde intelligente netwerken, architecturen voor informatienetwerken (combinatie van IN en TMN) en geavanceerde software-architecturen.

Evolutie van technologieën gebaseerd op de resultaten van RACE en andere EG-programma's, met name de evolutie van terminals naar een betere prijs/prestatie-verhouding en meer gebruikersvriendelijkheid

- multimedia-werkstations en beeldtelefonie;
- geavanceerde beeld- en geluidverwerking;
- digitale TV (SDTV, EDTV, HDTV);
- stembesturing in natuurlijke taal;
- ultra-LSI-apparatuur voor schakelingen en transmissiecircuits;
- geavanceerde microgolf-IC's gebaseerd op Si- en III-V-materialen;
- optisch-elektronische materialen en apparatuur voor telecommunicatie-applicaties.

Annex I

Project contributions to the RACE objectives

Annex 1

PROJECT CONTRIBUTIONS TO RACE OBJECTIVES

1. PART I : IBC Development and Implementation Strategies

1.1 Consensus Management and Synthesis

Project	Main Deliverable(s)	Impact
R1045 Consensus Management	Consensus management across all RACE projects, leading to the publication of Common Functional Specifications (CFS) for IBC. Workplan for, and organisation of the Technical Groups which undertook the drafting of the CFSs (staffed by other projects' participants).	Secured the "overall" results of the RACE programme, through co-operation between Industry and Operators within the project. Formal conduit for coherent transfer of RACE results to ETSI. Exploitation of results through standardisation, and by widespread distribution of CFS to organisations participating in RACE.
R1044 IBC Development & Implementation Strategies	Provided a consistent view of IBC systems options, based on own work and that of all other RACE projects. Functionally separated service definitions into service components and service control elements. Developed reference configurations for specific network implementations, and used these to identify and evaluate evolution steps towards IBC. Developed a series of detailed specifications defining the UNI at the "T" reference point (the termination interface for public networks).	Core project to the systems study of RACE. The largest source of RACE contributions to standardisation bodies. Many publications. Active in the detailed transfer of results to and from RACE usage projects, (via R1077) and all other systems projects. Provided the backbone of support offered to R1045 for development of the CFS.
R1077 URM	Compilation of operational requirements based on results of usage projects. Results captured in a usage database. Methodology for, and examples of the derivation of generic service definitions from usage requirements. Wide ranging contributions to CFSs and consensus formation.	Concepts relevant to service designers working in a market driven environment. Core project of the usage area of RACE. Impact mainly felt within the programme, transferring results to and from the systems projects.

1.2 Functional Specification

Project	Main Deliverable(s)	Impact
R1023 BEST	Functional Specification Methodology. Handbook and consultation support given to other RACE Projects.	Harmonised approach to functional specification work.
R1024 NETMAN	Models and Methods for TMN functional specifications (eg. Cube Model, QoS Methodology). The actual specification of TMN Functions. Animated Simulation (Hypermedia tool) of the behavioural aspects of TM Functions.	Significant impact on Standards (CCITT SG IV and ETSI NA4). Results exploited by EURESCOM and RACE II Projects.
R1025 SECURITY	Definition of basic security services (authentication, integrity, confidentiality, non repudiation and denial of service detection). Concepts for a functional architecture for IBC security and security policy guidelines.	Integration of security aspects within IBC specifications.
R1040 RIPE	Recommended Portfolio of Integrity Primitives. Specified modes of use for these.	Implementation of secured network systems. Improved understanding of integrity primitives (statistical tests and simulation tools).
R1047 TIMI	Development of integrity concepts within IBC services, to support legally binding procedures for data exchange.	Introduction of low cost, reliable and easy to operate security measures in IBC.

1.3 Reference Configurations

Project	Main Deliverable(s)	Impact
R1002 Satellite communication for IBC	Specification of satellite system capabilities with respect to their utilisation in evolutionary scenarios towards IBC	Identification of the role of satellite communications in IBC. Contribution to elaboration of IBC standards, identification of role of satellite technology within IBC
R1026 International Radio and TV	Identification of requirements and scenarios for the integration of the Eurovision network into IBC.	Eurovision and Euroradio network digitalisation, ensuring Europe remains in the forefront of technical excellence and programme quality. Essential step towards full digitalisation of TV media.
R1028 REVOLVE	Evolution Scenarios most likely to be implemented within Less Favoured Regions (LFRs) were identified and assessed. Platforms for co-operation of Sector Actors established in Portugal and Greece	Tools for strategic planners responsible for LFRs, in their preparation of business plans and justification for further investment in infrastructure
R1041 FUNCODE	Techno-economic studies to determine optimal locations for video codecs. Contributions to image and voice coding standards.	Standardisation and strategic network planning of audio-visual services.
R1049 ATM Concept	Contributions to the specification of the ATM layer, ATM signalling protocol and Connectionless Services in B-ISDN.	Contributions to ETSI NA5 and CCITT SG I, XI, XIII, XVIII Recommendations on B-ISDN.
R1052 SPOT	Simulation and optimisation of sub-carrier multiplexing systems for the CAC network	Exploitation, development and assessment of signal processing techniques in a CAC environment
R1053 TERRACE	TMN Reference Configurations at three levels of detail. Methods and criteria to design, describe and evaluate Reference Configurations. Concept of GAMS - Gradual Automation of Management Systems, used internally by the project to define the evolution of the TMN. Surveys and case studies (SDH, MAN and ATM)	Means of implementing TMN now understood in detail. Results exploited by EURESCOM, and are influencing ONP studies. Also exploited by RACE II projects addressing Reference Configurations for IBC Services. Significant contributions to Standards (CCITT & ETSI).
R1085 TET Adapt	Provision of tools for techno-economic analysis	Tools widely used for evaluation of IBC scenarios by RACE systems projects

1.4 Usage Reference Model

Project	Main Deliverable(s)	Impact
R1037 User criteria for the realisation of opportunities afforded by IBC	Development of a methodology to identify and quantify user requirements	Contribution to further work under R1071 (IBC Applications Analysis)
R1071 (1050) IBC Applications Analysis	Based on 126 case-studies in 102 organisations, the project has identified eleven generic IBC services and implemented a formalised methodology for description of IBC market developments	Market entry strategies for IBC. Improved understanding of factors affecting service take-up and delivered substantive usage data for the definition of IBC services.
R1076 REMUS	Requirements for Usability Design Targets Database	Method for making end-user requirements available to designers

PART II : IBC Technologies

2.1 Networks and Switching

Project	Main Deliverable(s)	Impact
R1012 BLNT	2 major demonstrators: an ATM switch model and a Customer Access Connection (CAC), based on SDH and an optical link, using OEICs. Definition of performance parameters for the ATM switch, based on traffic studies. VLSI produced to implement the switch. 4 patents filed relating to CAC and ATM.	Low cost local loop and ATM switch , able to support a wide range of broadband services in a flexible and cost effective manner. Demonstrated incorporation of new OEIC techniques and technologies. Contributions to standardisation of ATM/SDH mapping and broadband interfaces for the access network.
R1013 HDTV switching	Switch matrix chip operating in synchronous time division multiplex mode at speeds up to 1.25 Gbit/s.	Key technology for support of digital (HD)TV services using ATM switching networks.
R1014 Atmospheric	Network configurations and solutions to accommodate uncertainties in the growth and mix of services during network transitions towards a full ATM-based IBC. Flexible and economic network & system architectures to maintain compatibility with existing public / private networks and terminals, as advanced networks evolve. Solutions evaluated in a demonstrator.	Evolutionary network architectures and contributions to the standardisation of new transmission and switching techniques, and of interworking. Extended Stratified Reference Model (ERM) now adopted by ETSI allowing a more flexible use of the lower three layers of the OSI model.
R1022 ATD	Defined generic ATM components. Implemented RATT (R1022 ATD Technology Testbed), a laboratory network integrating several models of ATM subsystems. Introduction scenarios and techno-economic evaluation for ATM - consolidated in a Network Planning Guide. Other results include architectures and interfaces, ATM traffic engineering methods, performance evaluation of ATM traffic control, traffic source models, and signalling.	Major impact on the development of ATM Standards by ETSI & CCITT. Results further by exploited consortium members in RACE II (the laboratory testbed), and in national field trials. Commercially available products based on project prototypes (components and subsystems).
R1043 Mobile Telecommunications Project	Provided the foundation for the work now undertaken by RACE II projects in UMTS and MBS. Preparation of CFSs for UMTS	Definition of the spectrum requirements for UMTS. Prime-mover for the establishment of ETSI SMG5.

2.2 Optical Communications

Project	Main Deliverable(s)	Impact
R1008 Silicon-based Low-cost Passive Optical Components	Low cost passive optical components including very low loss waveguides, 3dB directional coupler, fibre pigtailed power splitter, 1:4 WMUX/DMUX devices	Components for the realisation of an economic and & flexible architecture of the Customer Access
R1010 Subscriber Coherent Multi-channel System	Demonstrator of a CMC network with a transmission rate of 140 Mbit/s on each of ten channels. Coherent optical devices evaluated on 3 testbeds: 622 Mbit/s CPFSK, 565Mbit/s DPSK, and 565 Mbit/s FSK	"Path-finder" technology, having strong economic potential to meet requirements of domestic customers for non-switched services in the longer term .
R1019 Polymeric Optical Switch	Optically non-linear polymers and devices, such as electro-optical modulators and 2x2 electro-optical switches	Progress towards low cost optical switching matrices
R1020 HYBRID	Integrated ultra-fast all-optical switching devices; technologies for low cost polymers	Low cost devices for all optical communication systems
R1027 Integrated Opto-electronics towards the Coherent Multi-Channel IBCN	Components for HDWDM: 3-channel DM-DPSK heterodyne transmission experiment using DFB lasers, state-of-the-art receiver preamplifier, InP integrated polarisation modulator, uniform grating DFB lasers with narrow spectral line width, multi-electrode DFB laser as FSK transmitter, continuous tuneable narrow line width DBR lasers, GSMBE amplifiers for coherent multi-channel systems, OEIC receivers (4 and 8 channels)	High bandwidth services through HDWDM using optical frequency multiplexing with coherent detection. Project results exploited commercially include : a grating, coherent transmitters and receivers and state-of-the-art fabrication techniques.
R1029 Improved InP Substrate Material for Opto-electronic Device Production	Semi-conducting Sn-doped and semi-insulating Fe-doped InP-substrates fabrication; method of routinely testing Fe-doped "Epi-ready" substrates	European InP- substrates, Sn- and Fe- doped, commercially available and competitive in world markets.

Project	Main Deliverable(s)	Impact
R1030 ACCESS	Flexible Customer Access Connection (CAC) for 622 MBit/s services in the future IBC (interactive services, plus analogue CaTV). CAC systems and architectures using TDMA/SCM 2 Mbit/s. Design and evaluation of key components and modules (Flexible multiplexers, broadband switches, EDFA-modules optimised for AM-TV distribution). Cost analysis has shown that fibre solutions are often cheaper than copper.	Cost optimisation of the Customer Access. Inherent flexibility in service provision to residential and small business users through use of optical network topologies. Realisation of corresponding Opto-electronic components.
R1031 Low Cost Opto-electronic Components	Integrated transceiver modules, high speed detector. Coaxial packages of lasers, micro-optics and detectors. 1.5 μm all MOVPE grown SIPBH lasers. Wafer testable 1.5 μm DFB-lasers Alignment and fixing of fibre and lenses, package material costs, hybrid integration of the opto-electronic and electronic functions.	Low cost active opto-electronic devices made commercially available for early implementation of IBC:
R1032 Optical Components for Subscribers Networks	Key components, technologies and test equipment required for introduction of optical fibres in customer premises	Low cost, rugged devices for use in Customers Premises. Complementary perspective to related projects addressing public networks
R1051 Multi-Gigabit Transmission in the IBC Subscriber Loop	10 Gbit/s optical transmission system distributing 64 TV-channels (each at 155 Mbit/s) to over 8 million different terminals	Technology for distributing digital (HD)TV now capable of supporting more subscribers than are likely to be connected to a single network node under any network architectures currently envisaged.
R1057 AQUA	High speed (up to 10 Gbit/s) and high power Quantum Well lasers	Europe now manufacturing high speed components for direct detection multi-gigabit transmission systems
R1064 MIOCA	Monolithically integrated, laser diode-monitor chip, and optical switch & amplifier chip with ridge waveguide structures.	Monolithic optical integration on InP substrates is a key technology for cost effective manufacturing of essential IBC components
R1069 EPLOT	Optical lasers for coherent systems, high speed devices for multi-gigabit systems, integration of amplifiers with DFB lasers	High density coherent systems and very high speed components made feasible, as a result of narrower spectral line-width and better control of wavelength.
R1089 LOOP	Realisation of superior quality passive optical components-better than any other commercially available devices. A low cost optical connector, de-mountable, achieving reflection-free 30% coupling to DFB lasers. A prototype connector-mounting machine for factory use. A fan-out connector (multi-way to single-way) equipped with optional monitoring functions.	The "Euro-Connector" now launched commercially, and adopted by most manufacturers and operators in Europe. Vigorous standardisation efforts ongoing, within international IEC and European CEN / CENELEC. Such components facilitate the earliest implementation of optical communications throughout Europe. Being truly transparent devices, evolution from multimode, to single mode and in future, to coherent transmission can be supported.

2.3 Advanced Information Processing

Project	Main Deliverable(s)	Impact
R1003 GUIDELINE	Synthesis of TMN Architecture based on experimental results and prototypes of other RACE I projects. Guidelines on the Application of AIP techniques to network management	Results exploited by RACE II and EURESCOM Projects. Potential harmonisation and reduction of risks in the commercial development of TMN systems. Significant contribution to Standards (CCITT and ETSI).
R1005 NEMESYS	3 major testbeds for the evaluation of AIP techniques for Traffic and QoS Management. Corresponding simulators for Network, ATM traffic, Services & Users. Practical verification using case studies on Call acceptance & Virtual path.	Reduction of risks in the commercial development of Traffic Management and QoS related TMN systems. Specific results (Simulators, Platform, testbeds) used by RACE II and ESPRIT Projects.
R1006 AIM	Prototypes of maintenance applications for BERKOM, System X and Interconnected MANs. Specification of corresponding IBC maintenance functions. Development of AIP based Generic Maintenance System (GMS) in 11 modules Evaluation of applicability.	Significant increase in the reuse of system components when developing new applications. Larger scale prototype GMS applied to real networks in RACE II (R2002 GEMA) and ESPRIT projects. Development of commercial products based on GMS.
R1009 ADVANCE	Prototypes for Network and Customer Administration Systems (NCAS). Evaluation of the applicability of AIP techniques .	Reduction of risks in the commercial development of NCAS. Results used by RACE II and ESPRIT Projects.
R1017 IOLE	On-line environment (operating system) to support the execution of applications within IBC. Prototype tools for on line software extension, fault tolerance, testing, monitoring and HMI.	An Open Services Architecture for IBC Applications. Exploited by project consortium (embedded in products) and RACE II projects.
R1021 ARISE	Prototype integrated software engineering environment, specifically tailored for Telecommunications. Methods for software reuse. More than 20 tools for use within the environment. Applied to ISDN and IN software development.	Improvements in the cost and time required to develop software. Results exploited by RACE II and ESPRIT Projects and consortium members. Products now being based on tools produced by the project.
R1046 SPECS	Method providing maximum automation in the production, execution and maintenance of telecommunications software, based on the use of FDTs - Formal Description Techniques. Ability to handle and incorporate less formal specifications. Open tool architecture to support the method. Prototype tool set used in pilot case studies.	Facilitated the application of Formal Description Techniques in industrial environments. Significant contribution to Standards (CCITT SG X and ISO). Results exploited by RACE II and ESPRIT Projects and consortium members.
R1068 ROSA I (see also R1093)	Feasibility study for an Open Services Architecture. Identification of requirements and development of the essential concepts to be incorporated.	Leading-edge technology and concepts for service provision. Justified increased RTD in this field.

Project	Main Deliverable(s)	Impact
R1093 ROSA II (See also R1068)	Architectural framework for the provision of IBC services - this a fundamental step towards the definition of an Open Services Architecture. Developed an object model (ROOM), compatible with the ODP standard, and incorporating the characteristics required in a Telecommunications Open Architecture and for IBC service specifications. Methodology for Service analysis, specification and implementation..	Major benefits in terms of cost and time for the development of advanced IBC services. Significant contribution to world-wide research initiatives (TINA-C). Results are exploited by EURESCOM and various RACE Projects.

2.4 IBC Customer Systems

Project	Main Deliverable(s)	Impact
R1001 DVT	Video codec and scanner assembly for 100 Mbit/s HDTV digital recorder on very high density ME tapes.	High density digital video recorder for the consumer electronics market.
R1004 Electro-luminescent Flat panel Display	1st European electro-luminescent (EL) flat panel display and corresponding driver developed and launched commercially.	World leadership in multicolour EL displays. Technology essential for multi-service terminal and high quality displays.
R1011 B-CPN	B-CPN demonstrator, validating a framework architecture covering business requirements across many applications and network sizes.	Economically viable evolution steps from current installations in customer premises, towards the future IBC.
R1015 D-CPN	D-CPN demonstrator, validating a concept which supports services and applications offered by pre-existing systems (e.g. EUREKA IHS) as well as new advanced services like switched high quality sound and video, using low cost technology.	Definition of services and technical/technological developments to facilitate the introduction of IBC in the domestic environment.
R1018 HIVITS	HDTV codec for use by the EBU during WARC 92 for HDTV broadcasting around 20GHz. (Digital video codecs for video telephony, TV and HDTV.) Successful demonstration that current low-bitrate coding standards can be significantly improved by means of advanced image analysis techniques. Significant advances in VLSI technology for video encoding.. Complete study of video transportation over ATM networks. Adaptation of current coding schemes for ATM.	World leadership in devising hierarchical multi-resolution coding techniques which will play a key role in the ongoing definition of digital TV standards. Central contribution to the development by ETSI of the 34Mbit/s standard for contribution codecs. Hierarchical coding is an essential element for the compatibility of different terminal types where video interworking will be required under future MPEG (& multimedia) standards. Products based on HIVITS technology are already being marketed. Basis for further analysis/coding projects in Race II.
R1035 CPN Part I	Specification of the terminal-CPN interface (at the S reference point), including medium adapters. Definition of CPN architectures suitable for business and domestic environments. Evaluation of options these provide, for evolution from present diverse implementations towards IBC.	Provided customers perspective on public-network termination requirements. Strong contributions to standards bodies (ETSI and CCITT). Results exploited within RACE Part II Projects.
R1036 WTDM Broadband Customer Premises Network	Broadband Customer Premises Network suitable for digital (HD)TV contribution services and for a wide range of applications up to 40 Gbit/s. Uses 16 WDM channels (at 2.5 Gbit/s each). Mux/Demux: 16 STM-1 to STM-16 and vice-versa. All-fibre 16x16 star coupler. Node controller for internal CPN routing. Wavelength demultiplexer with wavelength tracking. 2.5 Gbit/s silicon ASICs (interleaver/disinterleaver, 12x12 expandable cross-point switch matrix). Project has proven interworking of a WTDM CPN and a public B-ISDN through a protocol converter.	A practical solution for routing of studio quality digital video and HDTV signals within private domains. Can also support interworking across public networks : The viability of early IBC implementations depend on an ability to support a rapidly expanding demand for video services. Expectation that this technology will be increasingly exploited as HDTV is introduced. Contributions to ETSI TM3 on the use of SDH for studio quality video and audio services.

2.5 Usability Engineering

Project	Main Deliverable(s)	Impact
R1034 Usability Engineering Requirements for IBC	An overview of usability issues for IBC.	Contribution to IBC requirements in the area of Usability Engineering.
R1065 ISSUE	Usability requirements and design recommendations for videophone and multi-media retrieval services	Guidelines for embedding user requirements in the design process for IBC equipment and services
R1066 IPSNI	Functional specification of requirements for input/output media at the man-machine interface of a generic IBC terminal	Full incorporation of people with special needs within the population using IBC services and equipment
R1067 GUIDANCE	Design method and recommendations for distributed multi-author multi-media co-operative system	Guidelines for embedding user requirements in the design process for IBC equipment and services
R1088 TUDOR	Usability requirements, market data and design recommendations regarding elderly and/or handicapped people	Full incorporation of people with special needs within the population using IBC services and equipment

PART III Pre-normative Functional Integration

3.1 Demonstrators and Verification

Project	Main Deliverable(s)	Impact
R1007 ITIS	Multi-service, multi-media IBC terminal demonstrator on a PC platform with ISDN and TV interfaces	Initial implementation of functional design, modular architecture and user interface for multi-service terminals.
R1016 Test Tools and Equipment	Specific hardware, software and ancillary requirements for an IBC testbed.	Availability of tools for verification of Subscriber Network functionality
R1033 OSCAR	3 photonic switching demonstrators: Access Cross-Connect for fully transparent optical switching, space packet-switching at 622 Mbit/s and VHSOL with a ring structure New packaging techniques for low cost mass-manufacture of OEICs	Photonic switching components (optical switches, optical amplifiers, detectors and electronics) complete the realisation of systems employing all-optical transmission / switching .
R1038 MCPR	IBC terminal demonstrator on workstation platform, having multimedia, hypermedia, and ATM handling functions	Architecture for multi-media information access on IBC facilities
R1048 RSVP	Initial studies towards a common methodology for Verification	Identification of an approach for the development of common verification techniques
R1056 BIPED	A business IBC demonstrator integrating multi-service-terminals, CPN, customer access network and ATM switch with a gateway to ISDN	Assessment of the relationship between QoS and Network Performance within selected network configurations
R1072 ITACA	Protocol Conformance test specification and automation	Protocol specification and testing methodologies.
R1080 HDTV Experimental Usage	Complete chain of HDTV production, transmission, and consumer equipment according to HD-MAC.	Operational experience in HDTV production and distribution. Raised public awareness of HDTV, within Europe.
R1081 BUNI	IBC Demonstrator constructed as two separate sub-systems, each comprising multi-service terminals, customer premises network, customer access and broadband switch. One demonstrator addresses the broadcasters studio environment, the other, domestic needs. These were later integrated together as a final, 3rd demonstrator.	Major contribution to the agreed T-interface specification in Europe. Verification of IBC system design concepts. Feedback on the application of test tools to the demonstrator, to improve both future network performance and the tools themselves.
R1082 QOSMIC	Methods and Models for the verification of Quality of Service (QoS). 2 prototype tools for verification of QoS. Physically connected to the hardware test environment via the UNI. 4 Case studies evaluated. Animated presentation of project results.	Prototypes of future commercial test equipment. Significant contributions to standards formation in ETSI.
R1083 PARASOL	ATM traffic generator and analyser tools for network verification	Support of network integration projects with tools for testing and verification
R1084 MIME	Emulator/Simulator hybrid systems for ATM networks	Provision of tools to support design, verification and testing of methods, protocols and functions of IBC (including TMN prototypes)
R1087 PROVE	Development of a series of verification and testing modules as an integrated tool set : cell generator/analyser, testing of signalling protocols using test scripts, analysis of signalling and call handling	Verification, test and maintenance strategies for IBC. Contributions to ETSI (e.g. Computer Aided Test Generation). User interface design for test tools. Assessment of ATM signalling.
R1092 DIRAC	Definition of a structured data collection procedure targeted on an innovative analysis method for reliability data. Calculation of reliability of telecommunication systems.	Production of a specification on reliability prediction and measurement. Potentially a European standard.

3.2 Applications Pilots

Project	Main Deliverable(s)	Impact
R1039 DIMUN	Development and testing of new 'intelligent' applications & services to support distributed design and manufacture	A multimedia communications facility proven in an international manufacturing environment. Yielded increased efficiency, reduced costs and reduced time for the order-design-manufacture cycle
R1042 MULTIMED	Definition and development of a prototype multimedia environment for the health-care sector	Improvement in the accessibility and usability of multimedia health-care information.
R1054 APPSN	Six videophone service trials for (social care of) elderly and/or handicapped people	Service models for applications of videophone in social care; user requirements for elderly and handicapped people
R1055 MERCHANT	Definition of a general architecture for a pan-European ERP (Electronic Retail Payment) system. Implementation of a laboratory demonstrator. Validation of technical options for wider-scale implementation.	A new generation of ERP systems that respects the role, independence and responsibility of each existing ERP actor.
R1058 RESAM	Field trials have shown that real demand exists for broadband applications in the airline industry, supporting unscheduled aircraft maintenance. These applications involve video, still picture and broadband data transmissions, supporting aircraft maintenance . Users, their needs and business functions, application domains and system requirements were each identified or defined.	Meets the need for multimedia, distributed problem-solving applications within airlines, aircraft manufacturers and shipping companies. Potential applications in many other sectors identified, e.g. design, health care, crisis management, marketing and sales.
R1059 DIVIDEND	Production of functional requirement specifications for the use of advanced communications within the banking sector, and a multimedia terminal based on these.	Raised awareness of users re the potential offered by advanced services in banking sector. User interest triggered.
R1060 DIDAMES	Demonstration of collaborative work in manufacturing, using local and wide area broadband communications, supporting PC-integrated video conferencing.	Resulted in commercial tools, applications and telecommunications products. with emphasis on standards, (eg. for workstation interface cards and video codecs).

Project	Main Deliverable(s)	Impact
R1061 DIMPE	Pilot of Distributed Multimedia Publishing Environment between major publishing sites.	An understanding of publishers requirements, to realise commercial viability of the application. Development of an open, flexible application architecture and agreement on standards.
R1062 MARIN ABC	Demonstration of IBC application in the maritime industry: non-routine maintenance and repair of a ship at sea, with assistance of shore-based expertise.	Demonstrated feasibility and cost effectiveness of ship-to-shore video communications via satellite, to prevent/solve maintenance problems as they arise.
R1063 MAPS	Specification of four application pilot schemes for mobile communications	Focus and approach better defined for subsequent projects in RACE II
R1070 Testing pay-per view	Pilots for pay-per view television in three separate, existing CaTV networks. Specialised software for traffic modelling and evaluation tools.	Requirements for the man-machine interface. Strategy for the transition to IBC.
R1073 GEOTEL	Multinational pilot implementation of a library service for petrochemical and related industries	An effective commercial image library accessible from all over Europe (initially by ISDN)
R1074 ECHO	Installation of an IBC-based, electronic case handling system within insurance companies.	Increase in effectiveness and productivity of clerical and professional personnel in the insurance sector by the use of a distributed system of workstations and servers.
R1075 Telepublishing	2 Application Pilots : An individualised electronic newspaper The designing, printing and publishing of catalogues.	Scenario of a broadband working environment, providing easy, time shared interaction between separate locations in the printing and publishing industry.
R1078 European Museums Network	A full digital multimedia system with as applications, an authoring tool for museum staff and a "discovery machine" for navigation of the museum by visitors	Identification of requirements for workstations and man-machine interface.
R1079 CAR	A conference demonstrator to support design engineers at different sites in their decision-making. A remote surveillance system relevant to the manufacturing sector. A multimedia messaging system between the various actors in manufacturing design. New methodologies for requirements capture and evaluation	Provided an understanding of the implications of introducing IBC services in the automotive industry. Established knowledge base for future service design.
R1086 TELEMED	Demonstration of the potential for medical image and data transmission in an IBC environment	Stimulation of the development of medical applications such as remote expert consultation and diagnosis, co-operative research and teaching
R1091 ESP	Assessment of a common strategy for implementation of the communication links required to support RACE Application Pilots. Assisted in the Pilots' own assessment of requirements for end-systems, software protocols and network provision.	Focused the on-going discussions amongst Sector Actors, and acted as a catalyst for further network provision initiatives. Results & synergies achieved now exploited in RACE II.

Concerted Actions and Accompanying Measures

Date	Event / Workshop	Impact
1988 (7 Dates)	**RACE Concertation Meetings**	Established working relationships amongst RACE projects, with appropriate links to other CEC programmes (Esprit, COST and Eureka). Technical approaches and systems concepts pooled, to mutual advantage.
1989 (7 Dates)	**RACE Concertation Meetings**	Integration of application pilots, usage and verification projects within the on-going programme. Extensive work supporting the development of Common Functional Specifications (CFS)
6 & 14 June 1990	**User Meeting on Advanced Communications in Europe**	Raised awareness of the potential for application of advanced communications in different business sectors. Generated the interest of user organisations to respond to possible future call for application pilots.
20 June 1990 (in Dublin)	**IBC Islands Workshop**	Highlighted the extent to which broadband communications already existed, and showed how interconnection of such "islands" could feasibly be achieved in the shorter term
26 June 1990	**Fibre to the Home**	Examined the economics of deploying optical fibre in the Customer Access network, and highlighted the most promising technical approaches, for further development.
2 July 1990	**Mobile Communications in IBC**	Determined the relationship between systems supporting broadband and mobile communications. Intelligence in Networks and "Mobility in the fixed network" amongst the common factors.
10-12 July 1990 (in Aveiro)	**Optical Communications Summer School**	Strengthening of links with peripheral countries. Dissemination of optical RACE results to engineers expecting to begin research in this field.
15 October 1990 (in London)	**International IBC Conference**	Single conference giving the broadest coverage of RACE I results, and progress made in the functional specifications of IBC. Wide dissemination achieved.
23 October 1990	**Impact Assessment and Forecasting**	A review of socio/political issues pertinent to the development of IBC. An indication of the priorities for future RTD in the area.
24 October 1990	**Intelligent Network, Service Engineering and Usability**	Raised awareness of the potential for separation of service provision from network operation. Technological basis for a faster, more effective approach to service design, based on combinations of discrete service components.
26 October 1990	**IBC Implementation Framework**	Communication with the sector actors concerned. Examined the feasibility of implementing evolutionary scenarios developed within RACE.
30 October 1990	**Image Communications**	Identification of priority areas for RTD to meet emerging IBC requirements, based on a review of the state-of-the-art in image communications.
13 December 1990	**Intelligent Cities**	Development of co-operation between City authorities , in applying informational resources and communications links to find solutions to urban problems. Identified requirements for RTD, which led to the establishment of the ENS Action.
1990 (6 Dates)	**RACE Concertation Meetings**	Mid-Term results collated and fed into planning process for RACE II. First draft of CFSs fed back to projects.
10 September 1991	**Fibre to the User (International Audit)**	Comparison of roll-out strategies in Japan, USA, Canada and Europe, for introduction of optical fibre in the customer access. Factors determining the technical and economic suitability of the different approaches examined in detail
1991 (6 Dates)	**RACE Concertation Meetings**	Highlighted issues of common interest, for further examination. Second consolidation of CFS.
1992 (6 Dates)	**RACE Concertation Meetings**	Transfer of RACE I results to newly launched RACE II projects. Assured continuity of momentum and links between RACE Projects & other Programmes.

Annex II

Contributions to Standards

RACE
CONTRIBUTIONS TO STANDARDS

R1003 AIP and Standards for TMN

Taxonomy of Reference Points (Re view of M.30)	CCITT		1991/03	UK
Mediation function definition	ETSI	NA 4	1990/03	UK
Taxonomy of Reference Points (Review of M.30)	ETSI	NA 4	1991/03	UK
The workstation function	ETSI	NA 4	1990/03	UK
TMN reference point definition	ETSI	NA 4	1990/09	UK
Taxonomy of Reference Points (Re view of M.30)	ETSI	NA4	1991/03	UK

R1014 Atmospheric

Distributed Bit Scrambling Method for ATM Cells	ANSI	T1S1.1.	1989/09	Canada
The Distributed Bit Scrambling Method for ATM Cells	ANSI	T1S1.5	1990/02	USA
New questions on string mode for the next CCITT period	CCITT		1992/06	
Distributed Sample Scrambler : State Transition Machine	CCITT	SG	1991/06	Switzerland
Mapping of ATM cells into lower-order VCs	CCITT	SG	1992/03	
On the Equivalence Between two Proposed Network Architectures	CCITT	SG	1991/06	Switzerland
On the harmonisation of two proposed network architectures	CCITT	SG	1991/12	Australia
The Distributed Bit Scrambling Method for ATM Cells	CCITT	SG	1990/01	Switzerland
The Stratified Concept - an extension to ISDN PRM I.320	CCITT	SG	1990/01	Italy
Distributed Sampler Scrambler : Technical Description	CCITT	SG	1990/12	Japan
Cell Delineation with the Distributed Sample Scrambler	CCITT	SG	1990/10	Japan
Distributed Sample Scrambler : Synchronisation Confidence Limits	CCITT	SG	1990/12	Japan
Introduction of the Stratified Reference Model	ETSI	NA4	1989/11	
Signalling and Management in the SRM	ETSI	NA4	1992/09	
Stratified Reference Model	ETSI	NA4	1992/03	
31st Order Distributed Sample Scrambler	ETSI	NA5	1990/10	France
600 Mbit/s structure at T	ETSI	NA5	1989/03	Germany
Allocation of PTI Values	ETSI	NA5	1991/04	Netherlands
ATM Cell Format	ETSI	NA5	1989/03	Germany
ATM header error control cell delineation combined with scrambling	ETSI	NA5	1989/05	France
ATM Information Field Size	ETSI	NA5	1989/03	Germany
ATM Routing Field	ETSI	NA5	1989/03	Germany
ATM Routing Field	ETSI	NA5	1989/05	France
Distributed Bit Scrambler with 8-bit HEC	ETSI	NA5	1990/03	Italy
Distributed Bit Scrambling Method for ATM Cells	ETSI	NA5	1989/09	France
Distributed Scrambler with 31st order Polynomial	ETSI	NA5	1990/09	Spain
Frame Synchronisation	ETSI	NA5	1989/04	Netherlands
Layer Stamping	ETSI	NA5	1990/10	France
Mapping the ATM UNI into the SDH UNI	ETSI	NA5	1989/03	Germany
Media Adaptors at T	ETSI	NA5	1989/03	Germany
Multi-link protocols for ATM	ETSI	NA5	1991/09	Turkey
NT1 Functionality	ETSI	NA5	1989/04	Netherlands
Proposed Structure of CCITT B-ISDN Rec.	ETSI	NA5	1989/05	France
Service Requirements for ATM Priority and Layering	ETSI	NA5	1989/03	Germany
Service Requirements for ATM Priority and Layering	ETSI	NA5	1989/03	Germany
String Mode	ETSI	NA5	1991/09	Turkey
String Mode Protocol for ATM Network	ETSI	NA5	1991/04	Netherlands
Synchronisation	ETSI	NA5	1988/10	Netherlands
The Distributed Bit Scrambling Method for ATM Cells	ETSI	NA5	1989/10	Sweden
The Distributed Bit Scrambling Method for ATM Cells	ETSI	NA5	1989/11	UK
The Distributed Byte Scrambling Method for ATM Cells	ETSI	NA5	1990/04	Portugal
The resilience of the distributed bit scrambling method to Random or Malicious Interference	ETSI	NA5		
Transmission aspects - Virtual Bandwidth	ETSI	NA5	1992/09	
Transmission Format	ETSI	NA5	1988/10	Netherlands
Transmission Format for ATM	ETSI	NA5	1988/10	Netherlands
Transmission System on the Line Side of NT1	ETSI	NA5	1989/03	Germany
Virtual Network Concept	ETSI	NA5	1988/10	Netherlands
Virtual Path Identifier	ETSI	NA5	1988/10	Ireland

VPI Field Size at the UNI	ETSI	NA5	1989/11	UK
Proposal for definition of the Service Profile Concept for B-ISDN and its use for customer/access/terminal	ETSI	SPS3	1991/05	Germany
Mapping ATM into lower order VCs	ETSI	TM1	1990/10	Germany
The Distributed Bit Scrambling Method for ATM Cells	ETSI	TM3	1989/10	Portugal
Signalling at the UNI and NNI. Introductory Remarks	RACE	ARG	1990/06	Norway
Naming and Addressing within the Stratified Reference Model	RACE	STG 1.1	1992/05	
The Extended Stratified Reference Model	RACE	STG 1.1	1991/09	
Contribution to D410 CFS : Signalling Protocols	RACE	STG 3.1	1990/05	Belgium
Contribution to the Functional Model for IBC Basic Service	RACE	STG 3.1.	1991/02	Belgium

R1015 Domestic Customer Premises Network

Comments on Draft Recommendation I.363	ETSI	NA 5	1990/04	Portugal

R1018 High Quality Videotelephone and (High Definition) Television

Impact of digital transmission on HDTV sampling parameters	CCIR	IWP-11/	1990	
Hardware realisation of a 140/155 Mbit/s HDTV-codec progress report	CCIR	TG11-2	1991/02	France
ATM cell loss experiments with TM1	CCITT	IEC	1992/07	Netherlands
ATM cell loss experiments with TM1	CCITT	ISO	1992/07	Netherlands
H 261 compatible 2-layer video codec with high cell loss resiliance.	CCITT	SG XV	1991/05	France
Simulation of random cell loss	CCITT	SG XV	1992/01	UK
Two Remarks to the text of the Flexible Hardware specification	CCITT	SG XV	1989/11	Germany
Two Remarks to the text of the Flexible Hardware specification	CCITT	SG XV	1989/11	France
Two Remarks to the text of the Flexible Hardware specification	CCITT	SG XV	1989/11	Italy
Two Remarks to the text of the Flexible Hardware specification	CCITT	SG XV	1989/11	Netherlands
Two Remarks to the text of the Flexible Hardware specification	CCITT	SG XV	1989/11	Sweden
Two Remarks to the text of the Flexible Hardware specification	CCITT	SG XV	1989/11	UK
ATM cell loss experiments with TM1	CCITT	SG XV/1	1992/07	Netherlands
Error sensivity of the TM1 syntax	CCITT	SG	1992/07	Netherlands
Normes pour les systèmes de distribution secondaire	CMTT		1989	France
Rewording of annex A of report AD/CMTT	CMTT		1990/03	
Comparison of the two VLC and videomultiplier proposals according to report AD/CMTT	CMTT/2		1989/12	
Contribution codec VLC parameters	CMTT/2		1989/10	
Contribution to the adhoc group on 34 Mbit/s DCT coding	CMTT/2		1988/03	
Contribution to the specification writing	CMTT/2		1988/08	
Corrections and rewording to the draft recommendation AT/CMTT	CMTT/2		1990/03	
Criticality and Quantisation	CMTT/2		1989/09	
Hardware realisation of the 34/45 Mbit/s 4:2:2 codec and of the 140 Mbit/s HDTV codec	CMTT/2		1990/03	
Performances of the VLC based on ACVLC	CMTT/2		1989/10	
Proposal for an amendment to CMTT DCT ad hoc group document No 1	CMTT/2		1988/04	
Scanning standard to be used on the secondary distribution channels	CMTT/2		1990/02	
Specification of a variable length coding	CMTT/2		1989/09	
The issue of VLC and videoframing	CMTT/2		1989/10	
Variable length coding	CMTT/2		1989/08	
Videoframing	CMTT/2		1989/09	
VLC and videomultiplex proposal	CMTT/2		1988/06	
Hardware realisation of a 140/155 Mbit/s HDTV-codec Progress Report	CMTT/2	WB11	1991/02	France
34/45 Mbit/s videocodec - The issue of VLC and videoframing	ETSI	NA	1990	
Introduction to the project HIVITS	ETSI	NA	1990	
Status of the 34/45 Mbit/s contribution codec standard	ETSI	NA	1990	
H 261 compatible 2-layer video codec with high cell loss resiliance.	ETSI	NA 5	1991/04	Netherlands
Specification for CCITT H.261 comatible video coding for ATM networks	ETSI	NA 5	1992/02	UK
A draft proposal for ALL Type 2	ETSI	NA5	1992/05	UK

R1022 Technology for ATD

AAL-PDU Structure for CBR audio and video services	CCITT	SG	1990/01	Portugal
Sequence number protection for AALL Class 1 services	CCITT	SG	1990/05	Portugal
VCI Management For A Signalling Link	CCITT	SG		USA
"VPI/VCI pastition at UNI and ""active bits"" restriction"	CCITT	SG	1990/01	Germany
Compatibility Between S and T Interfaces In The Subscriber Premises Network	CEPT	NA5	1988/10	Portugal
Echo in the Finnish PSTN	CEPT	NA5	1988/10	Portugal
Bit Error Bursts At 139 264 kbit/s	CMTT	IWP		
Monitoring Of The Quality Of Digital Circuits Using ATM	CMTT	IWP		
On The Necessity Of Protection Against Cell Losses For High-Quality Audio And Video Services	CMTT	IWP		

Synchronization Aspects In A Pure ATM-Based Broadband Network	CMTT	IWP		
Treatment Of Cell Losses In An ATM-Based Broadband Network	CMTT	IWP		
AAL Sequence number synchronization algorithm	ETSI	NA 5	1990/09	Portugal
Application Of Maintenance Principles To B-ISDN Basic Customer Access	ETSI	NA 5	1989/03	
Impact of ATM Cell Size on Mobile Communications	ETSI	NA 5	1989/05	
Priorities In An ATM Network	ETSI	NA 5		Germany
ROS subattributes in I. 2XX	ETSI	NA 5	1989/11	
Sequence number protection for AAL Class 1 Services	ETSI	NA 5	1990/04	Portugal
Sequence number protection for AAL type 1	ETSI	NA 5	1990/10	Portugal
Service Bit Rates Amendments to Draft Rec. I. 2XX	ETSI	NA 5	1989/11	
Considerations on the ATM Layer Functions	ETSI	SPS 3	1990/04	
Considerations on the Cell Header Translation Function	ETSI	SPS 3	1990/04	
Considerations on the Physical Layer Functions	ETSI	SPS 3	1990/04	
Considerations on Virtual Channel	ETSI	SPS 3	1990/04	
Functions of ATM Network Nodes	ETSI	SPS 3	1990/04	
General Characteristics of ATM Network Nodes	ETSI	SPS 3	1990/04	
INTERFACES	ETSI	SPS 3	1989/10	
"Introduction, Scope and Field of Application (for Rec. on Broad-Bandswitching)"	ETSI	SPS 3	1990/04	
New Structure for Recommendation on Broadband Switching	ETSI	SPS 3	1990/04	
Some Considerations on Overload Handling	ETSI	SPS 3	1989/10	
ATM-Related Functions	ETSI	STG 3.2	1990/06	Netherlands
Connection Acceptance Control	ETSI	STG 3.2	1990/08	Netherlands
Connections through an Exchange	ETSI	STG 3.2	1990/06	Netherlands
Maintenance aspects of an ATM Exchange	ETSI	STG 3.2	1990/06	Netherlands
Performance of established connections	ETSI	STG 3.2	1990/07	Netherlands
Service specific functions in an ATM Exchange	ETSI	STG 3.2	1990/06	Netherlands
Traffic Characterization	ETSI	STG 3.2	1990/08	Netherlands

R1024 Functional Specifications for IBC System Requirements

QOS Methodology	ETSI	NA	1990/03	UK
Analysis of Network Management Requirements	ETSI	NA 4	1990/09	

R1030 Advanced Customer Connections, an Evolutionary System

Consideration concerning loopback in CAC	ETSI	NA 5	1991/06	Sweden

R1031 Low Cost Optoelectronic Components

Measurement Techniques for Essential Ratings and Characteristics of Components	CCITT	IEC		
"Blank detail specification: ""Coaxial laser"""	CENELEC	CECC	1989/04	Germany

R1035 Customer Premises Network

Physical Layer OAM for cell based option.	ETSI	NA 5	1991/09	
Cost and performance of different coaxial cable and receiver types.	ETSI	TM 3	1991/04	
Definition of terminal failure voltage for the coaxial interface at 155.52 Mbps.	ETSI	TM 3	1991/04	
"Input to the ""Living List"" for Rec. I.432."	ETSI	TM 3	1991/04	
Line code for Interfaces at TB- and SB reference points.	ETSI	TM 3	1991/04	

R1041 Functional Specifications of Codes

Principle of Functional Modelling	ETSI	NA 4	1990/09	France

R1044 IBCN Development of the Functional Reference Model

UK Contribution on Protocol Reference Models	CCITT	SG	1988	
UK contribution on Signalling Channel Structures	CCITT	SG	1988	
Optical CATV User-Network-Interface Based on a High-speed WDM	ETSI	NA 3	1990/02	Germany
Optical CATV-User-Network-Interface b.opt.	ETSI	NA 3	1990/02	Germany
Impact of intelligent Networks on TMN	ETSI	NA 4	1989/10	Denmark
A formal stage I description of Multi-Media services	ETSI	NA 5	1989/10	Denmark
AAL messages	ETSI	NA 5	1990/09	Belgium
AAL primitives for non-assured operation without flow control	ETSI	NA 5	1990/09	Belgium
AAL primitives for operation with flow control	ETSI	NA 5	1990/09	Belgium
AAL protocol model and peer-to-peer procedures	ETSI	NA 5	1990/09	Belgium
AAL type 3 functional model (allocation AAL)	ETSI	NA 5	1991/09	Belgium
An adaptation convergence sub-layer (CS) and protocol for connectionless services	ETSI	NA 5	1990/03	

An adaptation layer protocol model for signalling packet-mode connection oriented service and	ETSI	NA 5	1989/10	
An ATM Adaption Layer Protocol Model for IEEE LAN Interconnects	ETSI	NA 5	1989/11	Belgium
An ATM Adaption Layer Protocol Model for packet mode services	ETSI	NA 5	1989/11	Belgium
Analysis of Multi Media Aspects of Broadband Services	ETSI	NA 5	1989/10	Denmark
Answer to CCITT XI/4 open questions on meta-signalling	ETSI	NA 5	1990/09	Belgium
ATM adaptation layer for VBR service	ETSI	NA 5	1989/10	
ATM adaptation model layer service classification for non-time-related services	ETSI	NA 5	1990/03	
ATM signalling channel allocation and meta-signaling issues	ETSI	NA 5	1989/10	
Attributes classification	ETSI	NA 5	1990/09	Belgium
B-ISDN Arch.Prin.for Interactive and Non-Switch.Distribn.Services	ETSI	NA 5	1990/07	UK
B-ISDN Arch.Prin.for Interactive and Non-Switch.Distribn.Services	ETSI	NA 5	1990/07	Germany
B-ISDN bearer service definition	ETSI	NA 5	1990/09	Belgium
B-ISDN Connection Types and their attributes	ETSI	NA 5	1992/01	Belgium
Basic Requirements and Principles for MANs	ETSI	NA 5	1990/01	Belgium
Benefits of activation/deactivation at the TB reference point	ETSI	NA 5	1990/09	Belgium
Categorization of B-ISDN Connection Types	ETSI	NA 5	1992/01	Belgium
Clarification of channel associated signalling (CAS) at the access	ETSI	NA 5	1991/01	Belgium
Clarification of the ATM adaptation service classification model	ETSI	NA 5	1990/03	
Comments on ATM header functions	ETSI	NA 5	1990/10	
Comments on NA5 Draft Rec.1413 (UNI)	ETSI	NA 5	1989/11	
Comments on SG XI meta-signalling document	ETSI	NA 5	1991/01	Belgium
Common channel signalling (CCS) for B-ISDN	ETSI	NA 5	1991/01	Belgium
Contribution on Short term IBCN	ETSI	NA 5	1989/03	
Cost comparison of the coaxial with the fibre optical interface at UNI	ETSI	NA 5	1989/11	
Cost figures of a coaxial interface at UNI	ETSI	NA 5	1989/11	
Cost figures of a fibre optical interface at UNI	ETSI	NA 5	1989/11	
Error detection for PO services	ETSI	NA 5	1989/11	
Estimate of activation times for an activation/deactivation procedure at the TB reference point	ETSI	NA 5	1990/09	Belgium
Evolution of Optical Multi-Customer Access Links in the IBCN	ETSI	NA 5	1990/03	Germany
Guidelines for dynamic description of Multi-Media services using SDL diagrams	ETSI	NA 5	1989/10	
Implications of the introduction of the P bit for AAL type 3 and 4 (allocation AAL)	ETSI	NA 5	1991/09	Belgium
Information type related attributes for service components	ETSI	NA 5	1989/03	Germany
Introduction IBCN Reference Configuration	ETSI	NA 5	1990/03	
Introduction of the BRAN and LIT functional groups into the functional architectural model (allocation	ETSI	NA 5	1991/09	Belgium
Introduction to the static description of multimedia services	ETSI	NA 5	1989/03	Germany
Introductory description of multimedia services	ETSI	NA 5	1989/03	
List of parameters for the physical medium dependent layer of an electrical interface at the Tb reference	ETSI	NA 5	1989/09	
Location of meta-signalling in the B-ISDN FRM	ETSI	NA 5	1991/01	Belgium
Meta-signalling	ETSI	NA 5	1990/03	Italy
Meta-signalling message transport	ETSI	NA 5	1989/11	
Meta-signalling states description	ETSI	NA 5	1989/11	
Multi-media structure	ETSI	NA 5	1990/09	Belgium
Notes on Access Network MAN Architecture 5	ETSI	NA 5	1990/03	Italy
Open questions on meta-signalling raised at Brussels meeting of CCITT SG XI/4	ETSI	NA 5	1991/01	Belgium
Optical CATV User-Network-Interface Based on a High-speed WDM	ETSI	NA 5	1990/02	Germany
Optical CATV-User-Network-Interface b.opt.	ETSI	NA 5	1990/02	Germany
Optical Multicustomer Access Networks and its Evolution	ETSI	NA 5	1990/03	Germany
Optical Multicustomer Access Networks and its Evolution	ETSI	NA 5	1990/03	Germany
Optical Network Architecture for a Combined B-ISDN & CATV Multicustomer Access Link in IBCN	ETSI	NA 5	1990/04	Switzerland
Optical Network Architecture for a Combined B-ISDN & CATV Multicustomer Access Link in IBCN	ETSI	NA 5	1990/04	Germany
Optical Reference Configuration of Multigigabit CATV Customer Access Network (R.1051)	ETSI	NA 5	1990/02	Germany
Physical layer of the cell-based UNI	ETSI	NA 5	1990/09	Belgium
Power feeding accross the interface at the Tb reference point	ETSI	NA 5	1989/09	
Preliminary Network Architecture for the IBCN	ETSI	NA 5	1989/10	
Principles on Interworking	ETSI	NA 5	1989/10	UK
Proposal for a cyclic counting in the AAL sequence number field	ETSI	NA 5	1990/03	
Proposal for a data-link protocol as part of AAL Convergence Sub-layer (CS) protocol for non-time-related	ETSI	NA 5	1990/03	Italy
Proposal for basic primitives between the ATM adaptation layer (AAL) and the ATM layer	ETSI	NA 5	1990/03	
Proposal for primitives between the ATM adaptation layer and the ATM layer	ETSI	NA 5	1990/03	
Proposal for single BASIC ATM Adaptation (SAR) sub-layer for all Packet Oriented (PO) services	ETSI	NA 5	1989/11	
Proposed Document Structure for MAN Standards	ETSI	NA 5	1990/01	Belgium
Proposed Structure for ETSI draft ETSI on MANs	ETSI	NA 5	1990/03	
Prose description and definition of multimedia services	ETSI	NA 5	1989/03	Germany
Protocol Architecture for AAL type 3 and type 4 (allocation AAL)	ETSI	NA 5	1991/09	Belgium
Reference Configuration for TMN	ETSI	NA 5	1989/03	

Reference Configurations Construction Rules	ETSI	NA 5	1990/09	Belgium
Service Component Concept	ETSI	NA 5	1988/03	Germany
Service primitives exchanged between the ATM Layer Entity and the AAL Layer Entity (allocation PRS)	ETSI	NA 5	1991/09	Belgium
Service Requirements for MANs	ETSI	NA 5	1990/01	Belgium
Signalling requirements for multiparty calls	ETSI	NA 5	1990/09	Belgium
Specification of the Physical Characteristics for an electrical interface of 155.52 MBit/s	ETSI	NA 5	1989/11	Belgium
Stage 2 studies on Multi-Media Services	ETSI	NA 5	1989/10	Denmark
Support of Broadband distributive services	ETSI	NA 5	1989/10	
SVCI management protocol SDL	ETSI	NA 5	1990/09	Belgium
Target IBCN Reference Configuration	ETSI	NA 5	1990/03	
Target IBCN Reference Configurations	ETSI	NA 5	1989/03	
The BRANching functional group in the CAN	ETSI	NA 5	1992/01	Belgium
The Optical Line Outlet concept	ETSI	NA 5	1989/10	
The use of selective broadcasting	ETSI	NA 5	1990/09	Belgium
Transmission range for coaxial interface	ETSI	NA 5	1989/09	
Transmission ranges for an optical fibre interface	ETSI	NA 5	1989/11	
Use of generic layering architecture to structure the broadband user-network signalling interface	ETSI	NA 5	1989/10	
Use of unused octets in meta-signalling messages and indication	ETSI	NA 5	1991/01	Belgium
User network interface based on SDH	ETSI	NA 5	1989/10	
Utilisation of the 780 nm optical window for transmission at the UNI	ETSI	NA 5	1990/09	Belgium
A framework for the TSI TC/TR on "Signalling protocol requirements for B-ISDN services"	ETSI	NA5	1991/11	Finland
A proposal for S-AAL protocol architecture	ETSI	NA5	1992/05	Sweden
AAL functional models for class D services	ETSI	NA5	1991/10	Greece
AAL SSCP protocol model for B-ISDN signalling and CO Data Service	ETSI	NA5	1992/05	Sweden
AAL SSCP protocol model for B-ISDN signalling & (high speed) conection oriented data services	ETSI	NA5	1992/01	France
AAL type 3 functional model	ETSI	NA5	1991/09	Turkey
AAL type 4 functional model	ETSI	NA5	1991/09	Turkey
Application of the Service Component - Concept to stage 2 and 3 of I.130	ETSI	NA5	1991/04	Turkey
B-ISDN Connection Types and their attributes	ETSI	NA5	1992/01	France
Categorization of B-ISDN Connection Types	ETSI	NA5	1992/01	France
Cell delineation for burst & continuous ATM, cell based option	ETSI	NA5	1991/09	Turkey
Clarification of the PRM information flows	ETSI	NA5	1992/01	France
Comments on pr ETS DE/NA-52511 par. 13 "Operational Functions"	ETSI	NA5	1992/09	Sweden
Comparison of the BRAN FG Concept for the Optical Access Network as an addition to the liaison statement	ETSI	NA5	1992/04	Italy
Editorial amendment for paragraph 4.4 in I.432	ETSI	NA5	1991/10	Greece
Functional ATM Layer Model for service primitives definitions	ETSI	NA5	1991/09	Turkey
General NNIs and Interworking	ETSI	NA5	1992/09	Sweden
Identifiers for B-ISDN signalling	ETSI	NA5	1991/11	Finland
Impact of service component concept on stage 2 & stage 3 of CCITT Rec. I.130	ETSI	NA5	1991/10	Greece
Implication of the introduction of the P bit for AAL type 3 & 4	ETSI	NA5	1991/09	Turkey
Improved wavelength allocation	ETSI	NA5	1991/10	Greece
Introduction of BRAN into the Generic RC of CE; Introduction of BRANs into the FAM of a PL	ETSI	NA5	1992/09	Sweden
Introduction of the BRAN and LIT functional groups into the functional architecture model	ETSI	NA5	1991/09	Turkey
Loss priority parameter in AAL Primitives	ETSI	NA5	1991/10	Greece
Maintenance for cell based UNI	ETSI	NA5	1991/09	Turkey
Mapping of service components into bearer components for multimedia services	ETSI	NA5	1991/10	Greece
Naming conventions for primitives related to the association between VCI/VPI & CEI	ETSI	NA5	1992/01	France
No need for a Fast Reservation Protocol	ETSI	NA5	1991/09	Turkey
Physical layer functional model for service primitives definition	ETSI	NA5	1991/10	Greece
Physical Layer OAM for cell based option	ETSI	NA5	1991/09	Turkey
Physical layer OAM for cell based option	ETSI	NA5	1991/10	Greece
Primitives definition related to local monitoring functions : M-ATM CONGESTION-INDICATION	ETSI	NA5	1992/09	Sweden
Primitives definition related to local monitoring functions : M-ATM MONITOR-INVOKE	ETSI	NA5	1992/09	Sweden
Primitives definition related to local monitoring functions : M-ATM MONITOR-REMOVE	ETSI	NA5	1992/09	Sweden
Primitives definition related to local monitoring functions : M-ATM MONITOR-INDICATION	ETSI	NA5	1992/09	Sweden
Primitives exchanged between the PMD sublayer entity & the TC sublayer entity	ETSI	NA5	1991/10	Greece
Proposal for a Concept of multiparty	ETSI	NA5	1991/09	Turkey
Proposal for burst ATM transmission	ETSI	NA5	1991/09	Turkey
Proposed Structure for MANs	ETSI	NA5	1990/03	Italy
Protocol architecture for AAL type 3 & type 4	ETSI	NA5	1991/09	Turkey
Revision of ATM layer functional model	ETSI	NA5	1992/01	France
Revision of service primitives exchanged between the ATM Layer Entity & the AAL Layer Entity	ETSI	NA5	1992/03	Portugal
Service primitives exchanged between the ATM Layer Entity and the ATM Layer Management Entity	ETSI	NA5	1991/09	Turkey
Service primitives exchanged between the ATM Layer Entity and the ATM Layer Management Entity	ETSI	NA5	1991/09	Turkey
Service primitives exchanged between the ATM Layer Entity and the AAL Layer Entity	ETSI	NA5	1991/09	Turkey

Service primitives exchanged between the ATM Layer Entity and the SAR Sublayer Entity	ETSI	NA5	1991/09	Turkey
Service primitives exchanged between the ATM layer Management Entity related to data transfer	ETSI	NA5	1991/09	Turkey
Service primitives exchanged between the PH layer entity & the ATM layer entitiy	ETSI	NA5	1991/10	Greece
State matrix at TB interface for cell based option	ETSI	NA5	1991/10	Greece
The BRANching functional group in the Customer Access Network	ETSI	NA5	1992/01	France
The way ahead on broadband numbering within NA2	ETSI	NA5	1991/09	Turkey
Use of the PRM for user plane and control plane connection establishments	ETSI	NA5	1991/09	Turkey
Comments on SG XI meta-signalling document	ETSI	SPS 3	1991/01	Belgium
Comments on the CCITT SG XI metasignalling protocol working document WD4-33	ETSI	SPS 3	1990/04	Belgium
Global messages for remove and check procedures	ETSI	SPS 3	1990/10	Belgium
Global primitives for remove and check procedures	ETSI	SPS 3	1990/10	Belgium
Initialisation of Meta-signalling and SVCI assignment procedure	ETSI	SPS 3	1990/10	Belgium
Location of meta-signalling in the B-ISDN FRM	ETSI	SPS 3	1991/01	Belgium
Metasignalling protocol functions and limitations	ETSI	SPS 3	1990/04	Belgium
Open questions on meta-signalling raised at Brussels meeting of CCITT SG XI/4	ETSI	SPS 3	1991/01	Belgium
Point-to-point signalling channel management procedures and SDLs	ETSI	SPS 3	1990/10	Belgium
Signalling Virtual Channel Bandwidth	ETSI	SPS 3	1990/10	Belgium
Use of unused octets in meta-signalling messages and indication	ETSI	SPS 3	1991/01	Belgium

R1045 Consensus Management

UK contribution on the Service Component Concept for the definition of Multi Media Services	CCITT		1988	UK
UK contribution to CCITT SG XVIII on Protocol Reference Models	CCITT		1988	UK
UK contribution to CCITT SG XVIII on Signalling Channel Structures	CCITT		1988	UK
Overview of the current status of the CM0 activities I	CEPT	GMR	1990/11	Portugal
Presentation of RACE projects to GMR	CEPT	GMR	1990/01	
R1022 Initial Network Planning Guideline	CEPT	GMR	1989/12	Portugal
RACE Application Analysis R1071	CEPT	GMR	1990/09	
RACE Atmospheric R1014	CEPT	GMR	1990/09	
RACE Concertation Meeting Technical Workshops	CEPT	GMR	1990/01	
RACE Mobile Project R1043	CEPT	GMR	1990/01	
RACE Satellite Communication for IBCN R1002	CEPT	GMR	1989/07	Portugal
RACE: Spectrum Requirements for the 1-3 GHz	CEPT	GMR	1989/10	Italy
Request for support the RACE Workpackage EPF	CEPT	GMR	1989/03	Germany
Testbed Infrastructure for RACE Operation 92	CEPT	GMR	1989/03	Germany
Long Distance Network : Preliminary Results	CEPT	PSR	1989/12	Germany
Optical Interfaces for the Customer Access Network	ETSI		1991/01	Denmark
"Optical Transmission in the OLN, Architecture and Evolution"	ETSI		1991/01	Denmark
The Optical Line Outlet concept	ETSI		1989/10	France
Acronyms and abbreviations related to specificaiton and testing of communication systems	ETSI	ATM	1990/09	Netherlands
Draft report: State of research and standardisation in the area of analytical/formal test specification methods	ETSI	ATM	1991/06	Belgium
Draft Specification RACE B410: Protocol Conformance Testing	ETSI	ATM	1990/09	Belgium
Proposal for a new work item : Study of the Scope for interoperability testing	ETSI	ATM	1990/04	France
Requirements on methodology for conformance testing of lower layers in advanced digital networks	ETSI	ATM	1991/06	Sweden
Standardisation opportunities in the area of formal test methods	ETSI	ATM	1991/06	Sweden
Technical Specifications of the IBC PCT Service	ETSI	ATM	1990/09	Netherlands
Vocabulary	ETSI	ATM	1990/04	France
Vocabulary of interims terms	ETSI	ATM	1990/09	Netherlands
Vocabulary of stable terms	ETSI	ATM	1990/09	Netherlands
Proposal for extending the terms of references of ETSI/TC-HF	ETSI	HF	1989/10	Germany
ISDN Videotelephony Requirements for the Deaf	ETSI	HF 3	1990/07	UK
A comparison of the Layered Network models used in draft CCITT Recs. M.gnm and Gsna.1	ETSI	NA 4	1991/03	Belgium
A Stratified Reference Model - an Extension to ISDN PRM	ETSI	NA 4	1989/11	France
Contribution to the Definition of Reference Configurations (RCs) for the Telecommunications Management	ETSI	NA 4	1990/03	UK
Definition of QoS and NP	ETSI	NA 4	1990/09	France
Deletion of F Reference Point	ETSI	NA 4	1990/03	UK
Draft text for ETR on TMN vocabulary	ETSI	NA 4	1991/03	Belgium
Functional Scope of TMN	ETSI	NA 4	1990/09	France
Impact of Intelligent Network on TMN	ETSI	NA 4	1989/10	Germany
Mediation Function Definition	ETSI	NA 4	1990/03	UK
"QoS and NP, relationships between related terms"	ETSI	NA 4	1991/07	Belgium
Quality of Service Methodology	ETSI	NA 4	1990/03	UK
Reference Configuration Construction Rules	ETSI	NA 4	1990/09	France
Requirements Capture Methodology	ETSI	NA 4	1990/09	France
Revised Vocabulary of Terms for TMN	ETSI	NA 4	1990/09	France

Some comments on draft CCITT Recommendation I.35B	ETSI	NA 4	1990/09	France
Taxonomy and Naming of Reference Points	ETSI	NA 4	1991/03	Belgium
Telecommunications Management Specification Method	ETSI	NA 4	1991/03	Belgium
The Layering of OSFs	ETSI	NA 4	1990/03	UK
The timeline model	ETSI	NA 4	1991/07	Belgium
TMN Reference Point Definition	ETSI	NA 4	1990/09	France
A Formal Stage 1 Description of Multimedia Services	ETSI	NA 5	1989/10	Denmark
AAL protocol model and high level description of the AAL peer-to-peer procedures for B-ISDN signalling	ETSI	NA 5	1990/09	Spain
Addressing Requirements in MAN	ETSI	NA 5	1990/04	France
All functional Models for Class O Services	ETSI	NA 5	1991/10	Belgium
An Adaptation Convergence Sublayer (CS) Protocol for Connectionless Services	ETSI	NA 5	1990/03	Italy
"An Adaption Layer Protocol Model for Signalling, Packet Mode-Connection oriented and Connectionless	ETSI	NA 5	1989/10	Belgium
An Application Layer Protocol Model for Signalling - Packet Mode-Connection oriented and	ETSI	NA 5	1989/10	Denmark
Analysis of Multimedia Aspects of Broadband Services	ETSI	NA 5	1989/10	Denmark
Answer to liaison statement from NA5 concerning Activation/Deactivation Procedures in B-ISDN	ETSI	NA 5	1990/03	Italy
Application of the Service Component concept to stage 2 and 3 of I.130	ETSI	NA 5	1991/09	Belgium
Assumptions on the Dynamic Behaviour of Multimedia Services	ETSI	NA 5	1990/03	Italy
ATM Adaptation Layer for VBR Services	ETSI	NA 5	1989/10	Denmark
ATM Adaptation Layer Service Classification for non-time related services	ETSI	NA 5	1990/03	Italy
ATM based Broadband ISDN	ETSI	NA 5	1989/03	Germany
ATM cell format	ETSI	NA 5	1988/12	Ireland
ATM Cell Header Error Protection	ETSI	NA 5	1989/04	Netherlands
ATM Header Functionalities and Size	ETSI	NA 5	1989/03	Germany
ATM Signalling Channel Allocation and Meta-signalling issues	ETSI	NA 5	1989/10	Denmark
ATM signalling channel structure and allocation	ETSI	NA 5	1989/04	Netherlands
Attributes and possible values for B-ISDN	ETSI	NA 5	1992/01	France
B-ISDN Architectural Principes for interactive and non-switched distribution services	ETSI	NA 5	1990/09	Spain
B-ISDN Connection Types and Attributes Values	ETSI	NA 5	1990/10	France
B-ISDN Reference Configuration with MAN and MSS	ETSI	NA 5	1990/04	France
Basic Concept of B-ISDN Connection Types	ETSI	NA 5	1990/10	France
Basic Requirements and Principles for MANs	ETSI	NA 5	1990/01	Germany
Benefits of activation/deactivation at the TB reference point	ETSI	NA 5	1990/09	Spain
Bit Timing for the Likely Solution	ETSI	NA 5	1989/04	Netherlands
Business customers where MAN facilities do not exist	ETSI	NA 5	1991/02	Belgium
Categories of B-ISDN Connection Types	ETSI	NA 5	1992/01	France
Clarification of Channel Associated Signalling (CAS) at the access	ETSI	NA 5	1991/01	France
Clarification of the ATM Adaptation Service Classification Model	ETSI	NA 5	1990/03	Italy
Comments on ATM Header Functions	ETSI	NA 5	1989/10	Denmark
"Comments on DETS ""Connectionless Broadband Data Service"""	ETSI	NA 5	1991/02	Belgium
Comments on NA5 Draft Rec. I413	ETSI	NA 5	1989/11	UK
Comments on SG XI metasignalling baseline document	ETSI	NA 5	1991/01	France
Comments on the NA4 liaison related to SAP location	ETSI	NA 5	1991/04	Belgium
Comments on the suitability of an activation/deactivation procedure of B-ISDN	ETSI	NA 5	1991/02	Belgium
Comments to draft Rec. I.311	ETSI	NA 5	1990/04	Portugal
Comments to draft Rec. I.363	ETSI	NA 5	1990/04	Portugal
Common Channel Signalling (CCS) for B-ISDN	ETSI	NA 5	1991/01	France
Commonality between SNI and T interfaces	ETSI	NA 5	1990/06	Finland
Congestion Control for CL Services	ETSI	NA 5	1990/04	France
Congestion control for MAN Networks	ETSI	NA 5	1990/09	Spain
Congestion Control of Connectionless Services	ETSI	NA 5	1990/06	Finland
Considerations on the use of physical layer maintenance signals for fault location indication	ETSI	NA 5	1990/09	Spain
Considerations on VPI/VCI Allocation for Physical Layer OAM Flows	ETSI	NA 5	1990/04	Portugal
Coordination of RACE Contributions	ETSI	NA 5	1990/04	France
Core network and interworking aspects	ETSI	NA 5	1991/02	Belgium
Cost comparison of the coaxial with the fibre optical interface at UNI	ETSI	NA 5	1989/11	UK
Cost figures of a coaxial interface at UNI	ETSI	NA 5	1989/11	UK
Cost Figures of a Fibre Optical Interface at UNI	ETSI	NA 5	1989/11	UK
Customer Network Evolutionary Aspects	ETSI	NA 5	1991/02	Belgium
"Description of the Convergence Sub-layer (CS) Protocol for UNI Access Signalling,Broadcast	ETSI	NA 5	1990/04	Portugal
DQDB Performance Enhancements	ETSI	NA 5	1990/04	France
Editorial amendment for par. 44 in I432	ETSI	NA 5	1991/10	Belgium
Error detection for PO services	ETSI	NA 5	1989/11	UK
Estimate of motivation time for activation/deactivation procedure for broadband ISDN	ETSI	NA 5	1990/09	Spain
Evolution of MANs	ETSI	NA 5	1991/02	Belgium
Evolution of mobile	ETSI	NA 5	1991/02	Belgium

Evolution of satellites	ETSI	NA 5	1991/02	Belgium
Evolution of the residential area	ETSI	NA 5	1991/02	Belgium
Evolutionary graph	ETSI	NA 5	1991/02	Belgium
First revision of I.140 attributes	ETSI	NA 5	1990/09	Spain
Functional ATM Layer Model for service primitive definitions	ETSI	NA 5	1991/09	Belgium
Handling of Distributed Databases	ETSI	NA 5	1991/09	Belgium
Impact of Deactivation on Metasignalling and Signalling	ETSI	NA 5	1991/03	Belgium
Impact of Service Components into Bearer Components for multi media services	ETSI	NA 5	1991/10	Belgium
Impact of the OLI/OLO concept on the evolution of services and of the optical access network	ETSI	NA 5	1991/02	Belgium
Inclusion of the OLI/OLO concept in CCITT Rec. I.327	ETSI	NA 5	1990/10	France
Indentifiers for B-ISDN Signalling	ETSI	NA 5	1991/10	Greece
Information Field Size	ETSI	NA 5	1989/03	Germany
Initialisation of metasignalling and SVCI assignment procedure	ETSI	NA 5	1990/09	Spain
Introduction of the BRAN and LIT functional groups into the functional architectural model	ETSI	NA 5	1991/09	Belgium
Introductory IBCN Reference Configurations	ETSI	NA 5	1990/03	Italy
List of Contributions	ETSI	NA 5	1990/09	Spain
List of contributions from RIC	ETSI	NA 5	1989/09	France
List of contributions from RIC	ETSI	NA 5	1989/10	Denmark
List of Contributions from RIC	ETSI	NA 5	1990/01	Germany
List of contributions from RIC	ETSI	NA 5	1990/03	Italy
List of contributions from RIC	ETSI	NA 5	1990/04	Portugal
List of parameters for the PMD layer of an electrical interface at the T-reference point	ETSI	NA 5	1989/11	France
Location of metasignalling in the B-ISDN PRM	ETSI	NA 5	1991/01	France
Loss Priority Parameters in AAL primitives	ETSI	NA 5	1991/10	Greece
MAN ACCESS Facility	ETSI	NA 5	1990/06	Finland
Management Issues related to MAN Architecture	ETSI	NA 5	1990/06	Finland
Mapping of Service Components into Bearer Components for multi-media Services	ETSI	NA 5	1991/10	Greece
Meta-signalling assignment procedure	ETSI	NA 5	1990/03	Italy
Meta-signalling message transport	ETSI	NA 5	1989/11	UK
Meta-signalling states description	ETSI	NA 5	1989/11	UK
Metasignalling Protocol Functions and Limitations	ETSI	NA 5	1990/04	Portugal
Metasignalling Protocol Issues	ETSI	NA 5	1990/04	Portugal
Model	ETSI	NA 5	1990/11	Germany
MSS Functional Model	ETSI	NA 5	1990/06	Finland
Multimedia service structure	ETSI	NA 5	1990/09	Spain
No need for a Fast Reservation Protocol	ETSI	NA 5	1991/09	Belgium
Notes on Access Network MAN Architectures	ETSI	NA 5	1990/04	France
On traffic and service evolution in TR in evolution onwards B-ISDN	ETSI	NA 5	1991/10	Belgium
Open questions on metasignalling raised at the Brussels meeting of CCITT SG XI/4	ETSI	NA 5	1990/09	Spain
Open questions on metasignalling raised at the Brussels meeting of CCITT XI/4	ETSI	NA 5	1991/01	France
Performance measurement aspects of the cell based interface	ETSI	NA 5	1991/02	Belgium
Physical Layer OAM for cell based option	ETSI	NA 5	1991/09	Belgium
Physical Medium Dependent Sublayer for the Broadband S Interface	ETSI	NA 5	1989/09	France
PL-OAM cells and rate-adaptation of the cell-based UNI	ETSI	NA 5	1990/09	Spain
Point-to-point signalling channel management procedures and SDLs	ETSI	NA 5	1990/09	Spain
Possible conflicts in CUG membership	ETSI	NA 5	1991/02	Belgium
Possible options for multiparty cells	ETSI	NA 5	1990/09	Spain
Power Feeding across the interface at the T-reference point	ETSI	NA 5	1989/09	France
Preliminary considerations of the early stages network evolution towards the B-ISDN	ETSI	NA 5	1990/09	Spain
Preliminary Network Architecture for the IBCN	ETSI	NA 5	1989/10	Denmark
Primitives between ATM and ATM LME for Meta-signalling	ETSI	NA 5	1991/03	Belgium
Primitives between ATM LE and ATM LME connection establishment/release	ETSI	NA 5	1991/09	Belgium
Principles of Interworking	ETSI	NA 5	1989/11	UK
Proposal for a cyclic counting in the Sequence number field	ETSI	NA 5	1990/03	Italy
Proposal for a new recommendation on Adaptation Protocol for Signalling	ETSI	NA 5	1990/04	Portugal
Proposal for a single BASIC ATM Adapt. (SAR) sublayer for all Packet Oriented (PO)Services	ETSI	NA 5	1989/11	UK
Proposal for Basic Primitives Between the ATM adaptation Layer and the ATM layer	ETSI	NA 5	1990/03	Italy
Proposal for cell delineation at S reference point	ETSI	NA 5	1989/10	Denmark
Proposal for Characterization of Broadband Traffic	ETSI	NA 5	1990/09	Spain
Proposal for data-link protocol as part of AAL Convergence Sublayer (CS) protocol for non-time related	ETSI	NA 5	1990/03	Italy
Proposal for Physical Layer Transmission Parameter	ETSI	NA 5	1990/04	Portugal
Proposal for Primitives Between the ATM adaptation Layer and the ATM layer	ETSI	NA 5	1990/03	Italy
Proposal for text on AAL Type 3 primitives for AAL operations to be inserted in I.363	ETSI	NA 5	1990/09	Spain
Proposal for text on AAL Type 3 primitives for non-assured operation without flow control to be inserted in	ETSI	NA 5	1990/09	Spain
Proposal for text on ATM Layer Primitives to be inserted in I.321	ETSI	NA 5	1990/04	Portugal

Proposal for the use of Terms in I.311	ETSI	NA 5	1990/03	Italy
Proposal of a new recommendation on a Metasignalling Protocol	ETSI	NA 5	1990/04	Portugal
Proposed Document Structure for MAN Standards	ETSI	NA 5	1990/01	Germany
Proposed structure of draft ETSs for MANs	ETSI	NA 5	1990/03	Italy
Qos Principles for CL Services	ETSI	NA 5	1990/04	France
Reference Configuration Construction Rules	ETSI	NA 5		Spain
Reference Configurations for the SB interface	ETSI	NA 5	1989/09	France
Reference Configurations (RC) and their Implementation Options	ETSI	NA 5	1989/11	UK
Section and Path Overhead Functions Required for Performance Monitoring at the UNI	ETSI	NA 5	1989/09	France
Selective broadcastsignalling channel (SBSVC) management	ETSI	NA 5	1990/09	Spain
Service Component Concept	ETSI	NA 5	1989/03	Germany
Service primitives between the ATM LE and the ATM LME for error reporting	ETSI	NA 5	1991/09	Belgium
Service primitives between the ATM LE and the SAR SLE	ETSI	NA 5	1991/09	Belgium
Service primitives exchanged between the ATM LE and the ATM LME for data transfer	ETSI	NA 5	1991/09	Belgium
Service Primitives exchanged between the PM Layer Entity and the ATM Layer Entity	ETSI	NA 5	1991/10	Belgium
Service Primitives for the Connectionless Data Service	ETSI	NA 5	1991/04	Belgium
Service Requirements for MANs	ETSI	NA 5	1990/01	Germany
Signalling Virtual Channel bandwidth	ETSI	NA 5	1990/09	Spain
Specification of different functionality	ETSI	NA 5	1989/11	UK
Specification of the self-synchronizing scrambler in Recommendation I.432	ETSI	NA 5	1990/09	Spain
Specifications of B-ISDN addressing functions - first draft	ETSI	NA 5	1991/02	Belgium
Stage 1 Description of CL Service (1)	ETSI	NA 5	1990/06	Finland
Stage -1 Description of CL Service (2)	ETSI	NA 5	1990/06	Finland
Stage 2 studies on Multimedia Services	ETSI	NA 5	1989/10	Denmark
Support of Broadband Distributive Services	ETSI	NA 5	1989/11	UK
Surface Transfer Impedance in the specification of the TB interface	ETSI	NA 5	1990/09	Spain
Target IBCN Reference Configurations	ETSI	NA 5	1990/03	Italy
Termination of the section and path overhead (POH) at the UNI	ETSI	NA 5	1989/10	Denmark
Termination of the SOH and POH at the UNI	ETSI	NA 5	1989/09	France
Terminology Lifecycle	ETSI	NA 5	1990/09	Netherlands
Terminology (related to Connectionless Data Service)	ETSI	NA 5	1990/09	Spain
Terminology Related to connectionless Services	ETSI	NA 5	1990/06	Finland
Terminology Update	ETSI	NA 5	1990/10	Sweden
The Branching Functional Group with Functions and Reference Points in the Customer Access Network	ETSI	NA 5	1992/01	France
The Coding of the Sequence Number (SN) in SAR class 2	ETSI	NA 5	1990/04	Portugal
The messages used by the AAL protocol for B-ISDN signalling and connection oriented data services	ETSI	NA 5	1990/09	Spain
The OLI/OLO concept	ETSI	NA 5	1991/02	Belgium
The Optical Line Outlet Concept	ETSI	NA 5	1989/10	Denmark
The Optical Line Outlet Function	ETSI	NA 5	1990/10	France
The way ahead on Broadband numbering within NA2	ETSI	NA 5	1991/09	Belgium
Third-Party-Charging	ETSI	NA 5	1991/09	Belgium
Traffic aspects	ETSI	NA 5	1991/02	Belgium
Transmission aspects in the core network	ETSI	NA 5	1991/02	Belgium
Transmission Range for a Coaxial Interface	ETSI	NA 5	1989/08	France
Transmission ranges for an optical fibre interface	ETSI	NA 5	1989/11	UK
Units for Traffic Capacity in ATM Networks	ETSI	NA 5	1990/04	Portugal
Use of Generic Layering Architecture to structure the Broadband User - Network Signalling Interface	ETSI	NA 5	1989/10	Denmark
Use of the PRM for User Plane and Control Plane connection establishment	ETSI	NA 5	1991/09	Belgium
"Use of unused octets in metasignalling message, and identification"	ETSI	NA 5	1991/01	France
User Network Interface based on SDH	ETSI	NA 5	1989/10	Denmark
Vocabulary - Abbreviations	ETSI	NA 5	1989/09	France
Working procedures for ETSI/NA5	ETSI	NA 5	1990/09	Spain
Workprogramme for ETSI/NA5	ETSI	NA 5	1990/09	Spain
Execution of Service on a Functional IN Model	ETSI	NA 6	1989/11	Germany
Intelligent Network Terminology Definitions	ETSI	NA 6	1989/11	Germany
Liaison Report from RACE	ETSI	NA 6	1989/11	Germany
Liaison Report from RACE	ETSI	NA 6	1990/02	UK
Proposal for a functional Plane Architecture	ETSI	NA 6	1990/02	UK
Proposal for further Definition	ETSI	NA 6	1990/02	UK
Broadening of the User Concept in UPT	ETSI	NA 7	1990/09	Netherlands
Requirements for User Profiles in UPT	ETSI	NA 7	1990/09	Netherlands
UPT Numbering Plan Requirement related to the ACCESS of the UPT Service Centre	ETSI	NA 7	1990/09	Netherlands
UPT Numbering Plan Requirements related to Distinguishing between UPT - and ohter numbers	ETSI	NA 7	1990/09	Netherlands
UPT Numbering Plan Requirements related to Location Information included in the Number	ETSI	NA 7	1990/09	Netherlands
UPT Terminology	ETSI	NA 7	1990/09	Netherlands

UPT User Requirements related to Charging	ETSI	NA 7	1990/09	Netherlands
UPT User Requirements related to Information Feedback at Call Set-up Time	ETSI	NA 7	1990/09	Netherlands
Numbering and Addressing Requirements Architectural Requirements	ETSI	NA2	1990/10	Denmark
Numbering and Addressing Requirements : Concepts of addressing	ETSI	NA2	1990/10	Denmark
Numberings and Addressing Requirements : Requirements from customers and B-ISDN	ETSI	NA2	1990/10	Denmark
Numberings and Addressings Requirements : Requirements from services with special addressing needs.	ETSI	NA2	1990/10	Denmark
Medium Term Evaluation on Codec location in B-ISDN	ETSI	NA3	1989/10	UK
TV Picture frequencies used in picture coding for transmission	ETSI	NA3	1990/05	Sweden
Comments on SG XI metasignalling baseline document	ETSI	SPS	1991/01	France
Connection Acceptance Control	ETSI	SPS 3	1990/10	Italy
Definition of Call and Connection in the B-ISDN	ETSI	SPS 3	1990/10	Italy
Performance of Established Connections	ETSI	SPS 3	1990/10	Italy
Requirements for the separation of Call and Connection Control	ETSI	SPS 3	1990/10	Italy
Traffic Characterization	ETSI	SPS 3	1990/10	Italy
Spectrum Allocation in the Optical Local Network	ETSI	TM 1	1989/10	France
CMI coding on the 155.520 Mbit/s optical interface	ETSI	TM 3	1991/04	Belgium
Cost benefits of utilising the 800 nm optical window for transmission at the UNI	ETSI	TM 3	1991/04	Belgium
EMC aspects of CATV cable at the B-UNI: spectral considerations	ETSI	TM 3	1991/04	Belgium
Functional Architecture Model & Realisation of an Optical Access Network (OAN) with OLI/OLO	ETSI	TM 3	1991/04	Belgium
Improved Wavelength Allocation in OAN's	ETSI	TM 3	1991/10	Belgium
Optical Interfaces for the Customer ACCESS Network	ETSI	TM 3	1990/04	Germany
Optical Interfaces for the Customer Access Network	ETSI	TM 3	1991/03	Belgium
Optical Transmission of the OAN - Architecture and Evolution	ETSI	TM 3	1991/03	Belgium
Proposal for Physical Layer Transmission Parameters	ETSI	TM 3	1990/04	Austria
Quality of Services and Netw. Performance Requirements in ATM Networks	ETSI	TM 3	1989/10	Portugal
Specification of Surface Transfer Impedance to Tb interface cabling and connectors	ETSI	TM 3	1991/04	Belgium
Utilisation of the 800 nm optical window for transmission at the UNI	ETSI	TM 3	1990/10	
Evolution towards UMTS	ETSI	UMTS	1990/11	Belgium
Status of the RACE Mobile Project	ETSI	UMTS	1990/11	Belgium
Study items for the network aspects of UMTS	ETSI	UMTS	1991/03	Belgium
UMTS at the Turn of the Century	ETSI	UMTS	1990/08	Belgium
UMTS Requirements to B-ISDN	ETSI	UMTS	1990/11	Belgium
UMTS Services - Environmental Considerations/Potential Usage Characteristics	ETSI	UMTS	1990/11	Belgium

R1046 Specification and Programming Environment

"Extension of SDL to support Object-Orientation, Generic Parameter and Libraries"	CCITT	SG X	1990/06	Finland

R1053 TMN Evolution of Reference Configuration for RACE

A TMN Functional Hierarchy	ETSI	NA 4	1990/03	UK
Contribution to the Definition of Reference Configurations (RCs) for the Telecommunication Management	ETSI	NA 4	1990/03	UK

R1054 Application Pilot for People with Special Needs

Specifications of terminals for disabled users with respect to standards for user-system interface	ETSI	NA3.2	1991	

R1060 Distributed Industrial Design and Manufacturing

"Structural Walkthrough of the IPC Standard and Electrical Conceptual Model, STEP"	CCITT	ISO	1990/09	Germany

R1077 Usage Reference Model for IBC

Engineering IBC Services. Joint URM/CSF/RCD Position Paper	ETSI	HF-1008	1991	

R1079 CAR-CAR/CAM for Automotive Industry in RACE

Appraisal of M-IT-04	CEN	TG 11-2	1992/06	UK

R1080 HDTV Experimental Usage

Progress on development of studio equipment for progressively scanned HDTV	CCIR		1991/02	
Progress on HDTV standards conversion	CCIR		1991/02	
Progress report on the 1250/50/2 system	CCIR		1991/01	

R1082 Quality of Service (QoS) Verification Methodology and Tools

"Relationship between Qos terms such as Planned, Achieved, Inferred, Qos etc."	ETSI			
"Qos and NP, Relationship between related terms."	ETSI	NA 4	1991/07	France

The Timeline Model

	ETSI	NA 4	1991/07	France

R1089 Low Cost Optimized Optical Passive Components

"Sectional Specification, Connectors sets type CF08"	CCITT	IEC	1990/07	France
"Sectional specification, connectors sets type CF08"	CENELEC	CECC	1990/10	France

Annex III

List of Publications

RACE
List Of Publications

R1001 Digital Video tape Recording Terminal for HDTV

A new single-table assignment technique for transform coded images
1990/04 Paper for 8th Conference on Video, Audio & Data Recording

A Simple Recursive Motion Estimation Technique for Compression of HDTV Signals
1992/04 IEEE proceedings 4th Int. Conf. Image Proc. & its Applications (IPA 92), Conf. Publ. No 354 -

Characterisation and measurements of non-linear bit shifts in digital magnetic tape recording
1990/04 8th conference on Video, Audio & Data Recording

CoCr double-layered media with NiFe and CoZrNb soft-magnetic layers
1988 Journal of Applied Physics, vol 63(8)

Data Compression System for Home-Use Digital Video Recording
IEEE Journ. Sel. Areas Commun, Spec. Issue on Digital Rec.

Digital Consumer HDTV Recording based on Motion Compensated DCT Coding of Video Signals
1992/06 Signal Processing and Image Communications, Vol 4, No 3

Electronics for reading and writing
1991/06 Digest of the Magnetic Recording Conference 1991 (TMRC 91)

Error detecting run-length limited sequences
1990/04 8th Conference on Video, Audio & Data Recording

Full-Search versus Tree-Search Vector Quantization of Discrete Cosine Transform Coefficients
1990/09 Proceedings of the European Signal Processing Conference

Head-to-tape spacing and recording process evaluated from modulation noise spectra
1988/11 Intermag 88, IEEE Trans. Magn.

High-performance metal-in-gap heads with very small track widths
1990 J. Magnetism and Magnetic Material (jmmm) 83

High-performance small-track-width metal-in-gap heads made by reactive-ion etching
1990 J. Magnetism & Magnetic Materials (JMMM)

Implementation of TV and HDTV in B-ISDN
1990/09 Invited paper for 16th ECOC conference

Magnetic recording trends: media developments and future (video) recording systems
1990/01 MRM'89, published in IEEE Trans Magn, vol 26

Modelling of electromagnetic systems
1991/11 IEEE Transaction on Magnetics, Vol. Mag-27, No. 6

Motion adaptive intraframe transform coding of video signals
1989 Philips Journal of Research, vol 44 Nos 2/3

On the Construction of High-Performance Self-Synchronizing Codes
1990/10 Proceedings 11th Benelux Symposium Information Theory, Noordwijkerhout 1990

On the interpretation of tape friction
1990 IEEE Trans Magn., vol 26

Perpendicular recording with a one-sided MIG-head on SL Co-Cr
Intermag'90

Source Coding of HDTV with Compatibility to TV
1990/10 SPIE Vol. 1360, Proc. 5th Visual Communications & Image Processing '90

Sputtered sandwich heads for high-density digital video recording
1990/04 INTERMAG Conference

Structural Inhomogenities in Co-Cr layers and the influence on the magnetic properties
1989 PMRC'89, Journal Magn. Soc

Transform Coding of Digital TV Signals using Vector Quantization
1990 Image Communication

Transform Coding of Images using Adaptive Tree-Searched Vector Quantization
1988/09 Abstract in Proceedings Picture Coding Symposium

Transform Coding of Images using Directionally Adaptive Vector Quantization
1988/04 Proceedings International Conference on Accoustics, Speech and Signal Processing

R1002 Satellite Communication for IBC

Satellite links and integrated broadband communication networks
1990/10 Int. Conf. on Integrated Broadband Services & Networks

R1003 AIP and Standards for TMN

A Model of the TMN Workstation Function
1991/11 Proceeding of the Fifth RACE TMN Conference.

A Proposal for an Integration Methodology for a TMN
1991/11 Proceedings of the Fifth RACE TMN Conference

An architecture for the management of a Broadband Multi-service network
1990/05 XIII International Switching Symposium Proceedings

Broadband Communications Management the RACE TMN Approach
1990/10 IEEE Broadband Conference on Broadband TELECOM

Network Management for RACE
1991/11 British Telecommunications Engineering Journal, to be pub. later this year.

Synergies Between ESPRIT and RACE
1990/08 European conference on Artificial Intelligence (ECAI - 90)

Telecommunications Management Network Concepts
1990/01 IEE Electronics division colloquium organised by professional group E7 (Telecom Networks &

The application of information modelling in the telecommunication management network (TMN)
1991/03 Telecommunications Information Networking Architecture Workshop (TINA '91)

R1004 Electro-Luminescent Flat Panel Display for Terminal Applications

A 9 inch diagonal Compact, Multicolor TFEL Display
1991 SID 1991

Active matrix CdSe TFT addressed electroluminescent displays
1988/10 Proceedings of the International Display Research Conference

Aspects on Thin-film Electroluminescence
1990 Acta Polytechnica Scandinavica, Vol. Ph. 170

Bildschirme Flache Flundern
1989/03 Techno-Tip Nr. 3

Brightness and light conversion Efficiency in High Field AC Electroluminsescence
1990 Acta Polytechnica Scandinavica, vol Ph 170

Design of a prototype active matrix CdSe TFT addressed EL display
1990/09 Eurodisplay '90

Development of Advanced Thin-Film Electroluminescent Displays
1990 Proceedings of Eurodisplay 1990

Evaluation of a 64x64 CdSE TFT Addressed ACFTEL display demonstrator
1991/10 91 International Display Research Conference

Green Emitting Thin-Film Electroluminescent Device grown by Atomic Layer Epitaxy
1990 SID 1990 DIGEST

High-voltage polycrystalline CdSe TFT's
1990 IEEE Transactions on Electron Devices, ED-37.

Large Area VGA-Compatible EL-Display with 16 Gray Shades
1989/06 ED 89 Electronic Displays Conference Proceedings

Low-Power Thin-Film Electromuniscent Display
1991 SID International Symposium, Digest of Technical Papers, Vol. XXII

Modeling & Simulation of an ACTFEL Display
1990 SID 1990 DIGEST

Modeling the Luminescence of the ACTFEL Display
1990/06 5th International Workshop on Electroluminescence

Multi-colour Thin-Film Electroluminescent Displays
1992 6th Int. Workshop on Electroluminescence - El Paso

Multicolour Electroluminescent Displays
1990 Proceedings of 14th Nordic Semiconductor Meeting

The realization and evaluation of poly-CdSe TFT driving circuits
1988/10 Proceedings of the International Display Research Conference

Thin-Film Electroluminescent Displays
1989/05 Society for Information Displays,Seminar Lecture Notes,volume I

R1005 NEMESYS - Traffic and QOS Management for IBC

A Model of the TMN Workstation Function
1991/11 5th RACE TMN Conference - London

AIP Utilisation in Traffic and Quality of Service Management Systems
1992/09 6th RACE TMN Conference - Madeira

An Approach to Distributed O-o databases
1991/06 2nd Workshop of the Object Modelling Special Interest Group

An Architecture for Distributed Network Management
1991/11 5th RACE TMN Conference - London

An Experimental Evaluation of Call Acceptance Management Algorithms in ATM Based Networks
1992/09 Canadian Conference on Electrical and Computer Engineering - Toronto

ATM Network Simulator
1990/11 GUIDELINE 2nd TMN Implementation Workshop

Constraint Logic Programming for a Virtual Path Bandwith Management
1990/11

Experience Design TMN Computing Platforms for constraining TMN Management Applications
1992/09 6th RACE TMN Conference - Madeira

Experience of Modelling and Implementing a Quality of Service Management System
1992/09 6th RACE TMN Conference - Madeira

Generic Management Browser
1992/05 IFIP Conference on Upper Layer Protocols, Architecture and Applications - Vancouver

HCI Consideration in TMN Systems
1992/09 6th RACE TMN Conference - Madeira

HCI in TMN : Issues and Technology
1991/11 5th RACE TMN Conference - London

Inference and Control in a Generic Maintainance System
1990 International Switching Symposium Stock

Integration in TMN Systems
1990/11 GUIDELINE 2nd TMN Implementation Workshop

NEMESYS and WINER: a comparison of two QoS Network Management Experiments
1990/11

ODP Viewpoint of IBCN Service Management
IBM Technical Report No 439104

OSI Management and UNIX - the OSIMIS Platform
1992/05 Dansk Data Conference - Copenhagen

Quality of Service Management in IBC : an OSI Management Based Prototype
1991/11 5th RACE TMN Conference - London

Service and Traffic Management for IBCN
1992 IBM Systems Journal 4Q.1992

Service Management for IBC
1992/10 IFIP/IEE International Workshop on Distributed Systems, Operation and Management - Munich,

Service Modelling in the NEMSYS Project
1991/11 5th RACE TMN Conference - London

TeleUSE UIMS Evaluation Report
1990/11 GUIDELINE 2nd TMN Implementation Workshop

TMN Implementation Architecture
1992/09 6th RACE TMN Conference - Madeira

Traffic Management for IBC Networks
1991/11 5th RACE TMN Conference - London

Using Neural Computing Methods to Build an Adaptive Distributed Routing Algorithm
1990/11 2nd TMN Workshop

Viewpoints on Traffic and Quality of Service Management in Telecommunication Management Networks
1992/09 6th RACE TMN Conference - Madeira

Virtual Path and Call Acceptance Management for ATM Networks
1992/09 6th RACE TMN Conference - Madeira

R1006 AIM-AIP Application to IBC Maintenance

A design of the Operation, Maintenance and Construction of an Intelligent Management Information Base
1991/11 Proceedings of the Fifth RACE TMN Conference

A knowledge based resource scheduler for network maintenance
1991/07 British Telecom Technol. Journal, Vol. 9, no. 3

A Model-Based Reasoning System for the Maintenance of Telecommunication Networks
1991/05 Eleventh Workshop on Expert Systems & Their Applications, Avignon '91 Conference

A Proposal for an integration methodology for a TMN
1991/11 RACE TMN 5 Conference

Advanced Information Modelling for Integrated Network Management Applications
1992

An architecture for the management of a Broadband Multiservice Network
1990/06 13th ISS

Computing beliefs according to Dempster-Shafer and Possibilistic Logic
1990/07 3rd Int Conference Information Processing & Management of Uncertainty in Knowledge Based

Computing Numerical Beliefs Using Propositional Inference as a Basis
1990/07 Conference -3rd International Conference on Information processing & the Management of

Conclusions from the BERKOM Maintenance Prototype and Recommendations for future Maintenance Systems
1991/11 Proceedings of the Fifth RACE TMN Conference

Design of the Resource Scheduler
1990/11 RACE TMN conference

Ein Modellbasiertes Expertensystem fur die Wartung von Telekommunikationsnetzwerken
1991/10 GI Jahrestagung Conference

Fault Management within Broadband Communication Networks by using a Knowledge Based System
1992/02 International Congress FAIR ONLINE'92 for Technical Communications

Inference & Control in a GMS for IBCN
1990/11 RACE TMN conference

Integrating Repair into the IBCN Maintenance Strategy
1991/11 Proceedings of the Fifth RACE TMN Conference

Knowledge representation of networks in the RACE project AIM
1990/11 RACE TMN conference

OBSIL: A simple object oriented query language as a basis for TMN systems interactions
1991/11 RACE TMN 5 Conference

Open University (UK) - Contributions to the course on data/knowledge bases.
1990/09 Preliminary Script on the Open University Interview on Object Modelling

Representation of generic structure and behaviour of networks for model based diagnostic applications
1991/07 British Telecom Technol J. Vol. 9 No 3

Representation of the Generic structure & Behaviour of Networks
1990/11 RACE TMN conference

The application of information modelling in the telecommunications management network
1991/07 Br Telecom Technol J. Vol 9, No 3

The Application of Information Modelling in the Telecommunications Management Network (TMN)
1991 TINA (Telecom Information Network Architecture) Conference

The Design and Construction of a Intelligent MIB
1991/11 RACE TMN Conference

The use of AIP techniques in Maintenance Systems for Integrated Broadband Networks
1990/10 Proceedings of International Conference on Integrated Broadband Services and Networks

Towards a logical basis for communication in network management
1991/07 British Telecom Technol. J., Vol 9 No 3

R1008 Silicon-based low-cost passive optical components

16-channel optical wavelength multiplexer/demultiplexer integrated on silicon substrate
1991/06 Proceedings EFOC'91

Birefringence control and dispersion characteristics of silicon oxynitride optical waveguides
1991 Electronics Letters 27

Fiber Pigtailed Wavelength Multiplexer/Demultiplexer at 1.55 microns ntegrated on silicon substrate
1990/06 Proceedings of EFOC '90

Fibre pigtailed silicon based low cost passive optical components
1990/09 Proceedings of ECOC'90

Integrated Photonic Circuits on Silicon
1989/07 NATO Advanced Study Institute

Low cost silica on silicon single mode 1:16 optical power splitter for 1550 nm
1990/06 Proceedings of EFOC'90

Low-loss PECVD silica channel waveguides for optical communications
1990/12 Electronics Letters

Microguides de lumière à très faibles pertes en technologie OIS pour communications optiques
1990/10 Journees Nationales d'Optique Guidee (JNOG)

New method for low cost and efficient optical connections between single mode fibres and silica guides
1991/01 Electronics Letters

Nouvelle methode de connexion entre circuit integre sur Silcium et fibre optique monomode
1990/10 11èmes Journees Nationales d'Optique Guidee (JNOG)

Precision prism coupling setup applied to measure silica planar optical waveguides on silicon
1992/05 University Report; General Report CV in physics.

Self-aligned multiple coupling for silica on silicon integrated optics
1991/06 Proceedings EFOC'91

Silica on silicon optical waveguide technology : results on 3 dB coupler realisation
1991/01 Proceedings of OCTIMA'91

Silicon based integrated optics : a suitable technolgy for a hybrid approach to optoelectronics
1991/01 Proceedings of OCTIMA' 91

Silicon oxinitide 3dB coupler for 1540 nm single mode applications
1991 Proceedings ECOC '91

Wide pass band wavelength multi/demultiplexer at 1.3/1.55 μm based on etched Fresnel mirror
1992/06 IEE Proc. J. Optoelectronics

R1009 ADVANCE - Network and Customer Administration Systems for IBC

A Decision Support System for Planning GSM Radio Coverage
1991/01 IEE Colloqium GSM and PCN enhanced mobile services

A Framework for Computing Platforms to support TMN systems
1991/11 Fifth RACE TMN Conference

A KBS for Mobile Cell Configuration
1990/11 4th RACE TMN conference

A Methodology for developing NCAS user interfaces
1991/11 Fifth RACE TMN Conference

A Model of a broadband session and of the corresponding charging record
1990/10 International Conference on Integrated Broadband Services and Networks

A Service Model for Network and Customer Administration Systems
1991/11 Fifth RACE TMN Conference

A specification of a distributed heterogeneous systems administration
1988/09 Workshop IEEE of future trends of distributed computing systems in 1990's

AIP architecture in R1009 ADVANCE
1989/04 TCG1 Workshop Laboratory de Marcoussis

An approach to Transparent Communication Handling in NCAS
1990/11 4th RACE TMN conference

An Architecture for the Implementation of an Integrated Management System
1991/04 Proceedings of Integrated Network Management II

An architecture for the management of a Broadband Multi Service Network
1990/05 XIII International Switching Symposium

An Implementation Architecture for Network and Customer Admnistration Systems
1991/11 Fifth RACE TMN Conference

Applying artificial intelligence techniques to heterogeneous network management
1989/09 Network Management and Control Workshop

Article on Portugese work in RACE
1989/07 Special supplement EXPRESSO

Development of Network and Customer Administration Systems
1991/07 BT Technology Journal, VOL. 9, NO. 3

Evaluating the combination of Logic and Object Oriented techniques in support of TMN
1991/11 Fifth RACE TMN Conference

Extending Database Technology
1991/01 AXIOM, Journal of LMERCSSON LTD. IRELAND, Issue 2

Generic Message Set - An Information Based Interaction Language
1990/11 4th RACE TMN Conference

Management of Open Networks in Heterogeneous Context
1990/09 International Symposium on Local Communications Systems Management - IFIP TC6

Model-based Network management
1990/11 4th RACE TMN Conference

OBSIL: a Simple Object-Oriented Query Language as a basis for TMN systems interactions
1991/11 Fifth RACE TMN Conference

OBSIL: An Object Based Query Language as a Basis for Telecommunciation Management Systems
1991/11 Proceedings of the Fifth RACE TMN Conference

Prototyping Network and Customer Administration Systems for the IBCN
1991 Telecom Eireann Technical Journal, Issue 8

Service Behavioural Modelling
1991/11 Fifth RACE TMN Conference

Techniques for resolving hetrogeneity & masking complexity in TMN systems
1990/11 IEE International Conference on Integrated Broadband Services & Networks

The application of object oriented distributed systems for Integrated Network Management Systems in IBCN
1990/11 4th RACE TMN conference

Unification of Heterogeneous Management by a Generic Object Oriented Agent
1990/11 4th RACE TMN conference

Will the Real Managed Objects Please Stand up
1991/10 6TH World Telecommunications Forum

R1010 Subscriber Coherent Multichannel System

100 kHz linewidth external cavity DFB laser assembly employing standard packaging methods
1989 Proceedings 15th ECOC - paper TuB10-5

140 Mb/s and 560 Mb/s FSK heterodyne polarisation diversity receiver using nearly perfect square-law
Electron. Lett., Vol. 26, No. 22

3.8 nm continous tuning range of a low threshold distributed Bragg reflected laser
1990/09 IEEE International Semiconductor Laser Conference

A 2.3 GHz low noise balanced receiver for FSK heterodyne reception, using commercially available
1989 Proceedings 15th ECOC - paper ThB20-7

A balanced polarisation diversity receiver using hybrid assembly methods and its use in optical coherent
1991 ECOC 91

A balanced polarisation diversity receiver using hybrid assembly techniques for coherent multichannel systems
1991 Elect. Letters

A Bidirectional 1.5/1.3 μm Gbit/s direct detection system overlayed by a coherent 1.5 μm T-distribution system
1991 Proceedings EFOC/LAN 91

A coherent multi-bitrate multi-channel system for simultaneous transmission of 140 Mb/s TV and 560 Mb/s
ECOC 90, Paper WeG2.2

A linewidth and bitrate flexible FSK heterodyne system, using a frequency discriminator and biphase linecoding
1989 ECOC '89, paper ThA21-5

A new DFB-laser diode with reduced spatial hole burning
1990 IEEE Phot. Techn. Lett., Vol. 2, No. 6

A polarization Diversity Circuit in Lithium Niobate for Coherent Optical Transmission
1989/06 IEE Colloquium Integrated Optics, contribution 5, Digest No. 1989/93

A self-routing ATM switch for small customer premises networks
1991/06 Proceedings Int. Conf. on Local Comm. Systems LAN and PBX

An Experimental Investigation into the Continuous Tunability of DBR Lasers
1988 Proceedings ECOC - Vol. 1

Analysis of Gain Coupled DFB lasers
1991/04 Proceedings Integrated Photonics Research, Topical Meeting

Analytical expressions for the sensivity penalty by large IF bandwidth in coherent optical ASK receivers with
1991 Elect. Lett., Vol. 26, No. 17

Application of coherent techniques in the subscriber loop
1989/01 Octima Workshop

Basic analysis of AR coated, partly gain coupled DBF lasers: inherent compromise between coupling strength
1991/05 IEEE Photonics Technology Letters

Basic Analysis of AR-coated, Partly Gain Coupled DBF lasers: The Standing Wave Effect
1991 IEEE J. Quantum Electron.

Biphase linecoding in an optical FSK heterodyne transmission experiment, without sensitivity degradation
1989 Electronic Letters - Vol 25, No.5

Buffer-insertion cell-synchroized multiple access (BCMA) on a slotted ring
1991/06 IFIP International Conference on Local Communication Systems, LAN AND pbx

CLADISS, a new diode laser simulator
1990/03 Topical Meeting on Integrated Photonics Research

Coherent DISPLAY STATUS 565 Mbit/s DPSK bidirectional transmission experiment with local transceiver
1989 Proceedings 15th ECOC - paper ThA21-

Coherent Fibre Optics for Telecommunications
1989 Plessey Research and Technology Review 1989

Coherent multi-channel subscriber systems and the RACE 1010 project
1990 IEE Coll., Digest 1990/116, paper 2

Coherent transmission in the local loop
1991 ISSLS '91

Compact and low feedback optical polarisation diversity device
1989 IOOC 1989

Comparison of Endless Polarization Control and Data-Induced Polarization Switching in an Ultra-Sensitive FSK
1990 OFC 1990

Comparison of polarization handling methods in coherent optical systems
1991 J. Lightwave Techn. LT-9

Comparison of polarization handling techniques in coherent systems
1991 Prof. OFC '91, paper WH4

Continuous Tunability of DBR-Lasers
1989 IOOC - Technical Digest, Vol. 2, (Paper 19A2-1, Invited).

Coupling coefficients in gain coupled DBF lasers: Inherent compromise between coupling strength and loss
1991/05 IEEE Photonics Technology Letters

Dependence of mode stability and linewidth of DFB lasers on facet reflectivity and coupling coefficient
1991 Elect. Letters 27

Design of index coupled DFB-lasers with reduced spatial hole burning
1991 IEEE Journ. Ligthw. Techn.

Dynamic Updating of Local Oscillator Preset Currents in a Coherent Multi-Channel Receiver
1991 ECOC'91

Engineers automatic control and frequency stabilization unit for the RACE project 1010: coherent multichannel
1991 ECOC '91/IOOOC '91, paper Th. C11.1

Entwicklung einer polarisation diversity heterodyne EmpfNngerwellenleiterschaltung auf InP
1990/04 ITG-Fachtagung Heterostruktur-Bauelemente

Fabrication and Spectral Characteristics of a 1.55 m Distributed Feedback Laser with a Tunable External Cavity
1989 Journal Appl. Phys. 66 (1989) 1525

Filter characterisitics of DBR amplifier with index and gain coupling
1991 Electron. Letters 27

Fully engineers transmitter laser units implemented in a coherent multi-channel demonstrator system
1991/09 ECOC '91

Gain coupled DBF lasers versus index coupled and phased-shifted DBF lasers: a comparison based on spatial
1991/06 IEEE J. Quantum Electronics

General purpose single-mode laser package provided with a parallel beam output having -60 dB interface
1989 Proceedings 14th ECOC

High Performance 1.5 Micron Wavelength InGaAsP Strained Quantum Well Lasers and Amplifiers
1991/06 IEEE J. Quantum Electronics

High performance balanced heterodyne front edge using special fibre coupling scheme
1991 Electronics Letters 27

High performance balanced receiver module using dual PIN diodes and refelction coating
1991 Proceedings OFC '91, paper WH4

High performance PIN photodiodes on waveguide for coherent communications
1990 ECOC 90, paper TuG4.2

High-performance, 2 channel FSK heterodyne system with polarization diversity receiver
1990 ECOC '90, paper WeG2.5

Hybrid balanced polarisation diversity front end receiver for coherent systems
1991 Proceedings OFC 91, Paper no. TuH5

Improved Bragg-reflectors by the introduction of gain coupling
1991/03 Semiconductor and Integrated Optoelectronics

Improved DBF characteristics by using a loss grating
1991/09 European Conference on Optical Communications (ECOC)

Improved performance of AR-coated DFB-lasers by the introduction of gain coupling
1990 IEEE Phot. Techn. Lett., Vol. 2, No. 3

In-situ etching depth monitoring for reactive ion etching of InGaAs(P)/inP Heterostructures by ellipsometry
1990 Appl. Phys. Lett. 57(10)

Influence of spectral hole burning on the linewidth enhancement factor in semiconductor lasers
1990 IEE Proceedings Part J, Vol. 137

Integriertes Polarisations-Diversity-Wellenleiternetzwerk auf InP-Basis fur einem optischen
1991/04 ITG-Kolloquim Photonische Komponenten

Large signal, multi mode DFB-laser model as part of an optical system simulation tool
1991 OFC '91, paper WM 4

Linewidth of single mode DFB lasers in the presence of spatial and spectral hole burning
1989 Proceedings 15th ECOC - paper TuA7-4

Linewidth rebroadening in DBF lasers due to bias dependent dispersion of feedback
1991 Electron. Letters 27

Low capacitance dual balanced integrated detectors for coherent communications
1989/09 16th International Symposium on GaAs and related Compounds

Low loss integrated polarization diversity device with standard coatings and low assembly tolerance
1990 ECOC 90, paper WeG1.4

Microware modelling of a high speed PIN photodiode and its application to an optical receiver
1989/01 IEE Meeting-Digest' Optical Detectors

Modelling of optical communication systems
1991 COST 216 Conference

Monolithic dual-pin-FET combination for coherent optical balanced receivers
1990/09 Proceedings16th Europ. Conf. on Optical Communications, ECOC 90, Vol. 3

Nearly perfect square-law demodulation in a FSK heterodyne polarisation diversity transmission experiment
1990 ECOC '90, paper WeG1.2

New endless polarisation control method using three fiber squeezers
1989/07 Journal of Lightwave Technology, Vol. 7, No.7

New FSK phase diversity receiver in a 150 Mb/s coherent optical transmission system
1988 Electron. Lett. 24 (1988)

Novel high precision alignment technique for polarization maintaining fibres using a frequency modulated
1990 Electr. Letters 26

Novel transverse twin guide tunable semiconductor laser
1990 ECOC '90, paper TuF1.1

One step epitay integration of GaInAs monitor photodiode and InP/GaInAs/InP rib waveguides
1989 IOOC

Optical FSK transmission with pattern-independent 119 photoelectrons/bit receiver sensitivity and endless
1989 Electron. Lett. 25

Optical technology options for the European IBCN
1989/05 Proceedings COMP-Euro 89

Optimization of Zn dopant profiles in a pin-diode/FET by combination of depth profiling techniques: a SMIS,
1990/09 Proceedings 16th Europ. Conf. on Optical Communications (EFOC'90), VOL. 3

Partly gain-coupled versus /4 shifted DFB laser : a comparison
1990/09 Technical Digest of the 12th IEEE International Semiconductor Laser Conference

Pattern-Independent FSK Heterodyne Transmission with Endless Polarization Control and a 119
1989 Proceedings of IOOC '89, Paper 18C2-3

Penalty free biphase linecoding for pattern independent FSK coherent transmission systems
1990/03 IEEE JLT, Vol. 8, No. 3

Pigtail connector with ultra low feedback
1989 IOOC 1989

Polarisation diversity waveguide network integrated on InP for a coherent optical recveiver front-end
1991 ECOC '91/IOOC'91, paper TU. C4.3

Polarisation effects in optical communication systems
1990 IEE coll. on polarisation effects in optical switching and routing systems

Polarization converter and splitter for a coherent receiver optical network on InP
1990/03 Proceedings Topical meeting on integrated Photonics Research, Technical Dig. Series Vol. 5, (W14)

Polarization-and pattern-independent optical FSK heterodyne system using data-induced polarization switching
1990 Electronics Lett., Vol. 26, No. 3

Prediction of linewidth floor in DFB lasers
1990 OFC 90, Tech. Digest THE 2

RACE project R1010 - coherent multicarrier transmission and switching for an optical frequency multiplexed
1991 Techn. Dig. OFC '91, paper THn4

Reliability and multichannel behaviour of a prototype CMC receiver
1991 EFOC '91

Signal and noise power measurements on monolithically integrated InGaAs/InP : Fe photodiode field-effect
ECOC '89, paper TuG4.5

Signal-Rauschmessungen an monolitisch integrierten InGaAsP/InP:
1990/04 ITG-meeting digest, Heterostruktur-Bauelemente

Single-Mode Laser Sources for FSK Systems
1989 IEE Proceedings, 1989, Vol. 136, Part J, No. 1

SPOCS a versatile tool for the system analysis and design of optical communication systems
ECOC 90, paper TuB1.3

TBOSS II: subcarrier upgrade for full multiplex operation of tunable single laser coherent transceivers
1991 ECOC '91/IOOC '91, paper We B9.2

TE/TM mode splitter on InGaAsP/InP
Electronics Letters, IOOC '89

The implementation of waveguides, optical devices and detectors on InP for implementation in optical divesity
1989 Proceedings 15th ECOC - paper ThB20-1

The RACE 1010 CMC Demonstrator
1991/06 EFOC'91

The use of a tunable DBR laser in a coherent multi-channel receiver
1990 EFOC-LAN 90, paper 3.6.4

Theoretical Investigation of the 2nd Order Harmonic Distrosion in the AM-Response of 1.55 μm F-P and DFB
1991/08 IEEE J. Quantum Electron.

Third R1010 Report on CMC broadband Customer Access
1990/09

Three-dimensional coupled mode method for simulation of coupler and filter structures
1991 Proceedings IPR '91

Transmitter wavelength stabilization in coherent multi-channel systems
Proceedings fibre Optics '90

Tunable TE/TM Convecter on (001)-InP-Substrate
1991 Photon. Technol. Letters, Vol. 3, No. 1

Tunable TE/TM Mode Converter on (001)-InP-Substrate
1990/09 Proceedings 16th Europ. Conf. on Optic. Commu. (ECOC), Vol. 1

Tunable three-section, strained MQW, PA-DBF's with large single mode tuning range (72 A) and narrow
1990/09 12th IEEE Int. Semiconductor laser conference, M4

Ultra-high receiver sensitivity for coherent transmission systems at 565/140 Mbit/s using DPSK/FSK modulation
1989/09 SPIE conference on coherent lightwave communications

Wavelength Tunable Single-Mode Metal-Clad Ridge-Waveguide Lasers for 1.55 μm Wavelength Region
1989 AEÜ (Vol. 43)

Yield analysis of non-AR-coated DBF lasers with combined index and gain coupling
1990 Electronics Lett., Vol. 26

Yield and Device Characteristics of DFB Lasers: Statistics and Novel Coating Design in Theory and Experiment
1989 IEEE Journal Quant. Electron. 25 (1989)

R1011 IBC Business CPN

A Distributed Control Protocol For Self Routing ATM Switches in Small Customer
1991/06 Proceedings EFOC/LAN Conference, IGI Europe

A flexible system concept for an Integrated Broadband Customer Premises Network
1990/10 International Conference on Integrated Broadband Services and Networks

Architecture and performance evaluation of a ring based ATM switch
1990/11 International Conference on Communication Systems

B-ISDN traffic on non-ATM LANs
1992/01 IFIP Estoril Conference

Evolutionary scenarios for the integration of ATM and STM in a broadband PBX environment
1992/10 International Conference on Computer Communication - Genoa

Evolutionary scenarios for the integration of ATM and STM in a broadband PBX environment - Evolutionary
1992/06 International Conference on Private Switching - London

Flexibles Systemkonzept zur Einfuhrung von BK-Diensten im privaten Netzbereich
1990/12 Nachtrichtentechnische Zeitschrift, Vol. 43

The BCPN Concept, its peculiarities and key features, its modular feasibility model and the evolutionary flexible
1992/10 International Switching Symposium - Yokohama

The FMTT and the ATM router
1992 Electronics & Communication Engineering Journal (ECEJ)

The FMTT and the ATM router
1992/06 EFOC/LAN Conference - Paris

R1012 Broadband Local Network Technology

A Connection Acceptance Algorithm for ATM Networks Based on Mean and Peak Bitrates
1990/06 International J. of Analog and Digital Cabled Systems, Vol 3, Issue No. 3

A Synchronous Switching for Broadband Networks
1989 Plessey Research and Technology Research Review 1989

An ATM Traffic Cell spacing and Policing Device for Multiple Virtual Connections on one ATM pipe
1991/04 RACE 1022 Workshop Network Planning an Evolution

An Experimental ATM Switching Architecture for the Evolving B-ISDN Scenario
1990/05 XIII International Switching Symposium Proceedings 1990

Asynchronous Switching for Broadband Networks
1989 Research Review 1989

ATM: Bandwidth Assignment and Bandwidth Enforcement Policies
1989/11 Globecom 1989

ATM - based switching for the integrated broadband network
1990/08 Electronics and Communication Engineering Journal

ATM Traffic Studies within the RACE BLNT Project
1991/06 Proceedings of the 13th Int Teletraffic Congress, North Holland Studies in Telecomm., rol 14

Bandwidth Assignement in Prioritized ATM networks
1990/12 Proceedings of GLOBECOM '90

Bandwidth Assignment and virtual call blocking in ATM Networks
1990 INFOCOM 1990

BISDN - The Future Universal Communications Network
1990/05 COMMUNIC Asia 1990

Blocking Probalilities in ATM Pipes Controlled by a Connection Acceptance Algorium Based on Mean and Peak
1991/06 International Teletraffic Congress

Considerations on ATM switching techniques
1988 International Journal of Digital and Analog Cabled Systems, Vol,

Contribution to the RACE invited paper on Subscriber Loop Applications
1990 1990 Atlanta ICC conference

Costi di produzione in funzione del livello di integrazione di Tx-Rx per sistemi ottici a larga banda
1989 FOTONICA '89 (National conference on optoelectronic applications) S.M. Ligure

Der ATM-Knoten des RACE-Projekts BLNT
1992/10 Funkschau

Economic evaluation of optoelectronic integration for optical broadband subscriber loops
1989 (Invited paper) ECOC

Electronic and Optoelectronic Integration in a Broadband Local network Optical Link
1990/10 IEE International Conference on Integrated Broadband Services and Networks

GaInAsP/InP Zero-Gap Directional Couplers as Compact Optical WDM Filters
1989/08 Electronics Letters

Guided Wave 1.3/1.55 μm Wavelength Duplexers in InGaAS/InP
1989 E.C.I.O. Conference Proceedings

High performance buried rider DFB lasers monolithically integrated with butt coupled strip loaded passive
1990/01 Electronics Letters, 26, 2

High speed silicon driver and receiver integrated circuits for broadband local network applications
1990/06 EFOC-LAN 90

InGaAsP/InP Directional Coupler Demultiplexers for 1.3 μm/1.53 μm Operation
1990/09 Proceedings 16th European Conference on Optical Communication

InGaAsP/InP Zero-Gap Directional Couplers as Compact Optical WDM Filters
1989 Electronic Letters Vol.25 (1989)

Input Rate Regulation and Bandwidth Assignement in ATM Networks:an Integrated Approach
1991/06 Proceedings of ITC 13

Loss Priorities in ATM Switching Networks
1990 Globecom 1990, paper 505.1

Method of economic evaluation for optoelectronic integation of broadband transceivers
1989 EFOC-LAN

Non-linear predictive source model for ATM
1990/04 7th UK Teletraffic Symposium, Paper No. 8, Proceedings published by IEE.

Optoelectronic Integrated Circuits for Telephony/Broadband Passive Optical Networks (TPON/BPON)
1990/09 12th IEEE International Semiconductor Laser Conference

Performance of a non-linear dispersive ATM source model
1990/07 BLNT RACE Workshop Traffic & Performance Aspects in IBCN

RACE BLNT: A Technology Solution for the Local Network
1990/10 Proceedings IEE International Conference on Integrated Broadband Services and Networks

Resource Allocation in ATM Networks
1989/10 3rd RACE 1022 workshop

Source Control and Sphaping in ATM Networks
1991/12 Proceedings of IEEE GLOBECOM '91

Statistical Multiplexing Peformance of a Connection Acceptance Algorithm
1990/07 BLNT RACE Workshop Traffic & Performance Aspects in IBCN

Switching ATM in a Broadband ISDN
1988/06 Proceedings, Birmingham NEC

Teletraffic Studies on ATM in the Broadband Local Network Technology RACE Project
1991/06 Proceedings of ITC 13

The Leaky Bucket Policing Method in the ATM Network
1990/06 International J. of Analog and Digital Cabled Systems,Vol. 3, Issue No. 3

The network evolution towards B-ISDN: Applications, network aspects, trials (eg BERKOM)
1990 ICC 90

Traffic Studies of a Multiplexer in an ATM Network & Applications to the Future Broadband ISDN
1989/10 International Journal of Digital & Analog Cabled Systems, Vol 2, Issue No 4

Traffic Studies of Transmission Bitrate Conversion in ATM Networks
1991/06 International Teletraffic Congress

Use of Priority in ATM Networks: Efficiency Evaluation
1990/07 RACE 1012 Workshop on Traffic and Performance Aspects in IBCN

Wellenlangenselektive InGaAsP/InP-Richtkoppler fuer die Integrierte Optik
1990/04 ITG-Fachberichte 112 : Heterostruktur-Bauelemente; vde-verlag gmbh, Berlin. Offenbach

Wideband optical subscriber links
1989 EFOC-LAN

R1013 Enhanced Performance Lasers for Optical Transmitters

A new DFB-laser diode with reduced spatial holeburning
1990/06 IEEE Photonics Technology Letters, vol. 2

A new DFB-laser diode with reduced spatial holeburning
1990/06 IEEE Photonics Technology Letters, vol. 2

A Switching Matrix 16 x 16 for 1.2 Gbit/s in 0.8 μm BICMOS Technology
1993 Annals of Telecommunication, special issue on 'Chip Technology for Telecommunications'

Design of a Switch-IC for HDTV (RACE R1013)
1992/03 Teleteknik

Ein Koppelfeldbaustein 16 x 16 für 1.2 Gbit/s in 0.8 μm BICMOS Technologie
1992/03/4-6 Proceedings of the ITG Conference on Microelectronics, Stuttgart

Packages and interconnections for high speed switching systems
1990/10 Proceedings of 4th conference on Electronic packaging & interconnections

R1014 Atmospheric

A B-ISDN switching system architecture
1990 ISS 90

A demonstration of techniques and technologies to provide switching functions in the transition to ATM
1990 ISS 90

A flexible architecture for the introduction of ATM
1990 Session A3, ISS 90

A Fluid Flow Queueing Model for Heterogeneous On/Off Traffic
1989/08 Nordic Teletraffic Seminar

A fluid flow queueing model for heterogeneous on/off traffic
1990/07 Workshop Traffic & Performance Aspects in IBCN

A hybrid concept for migration towards an ATM based integrated broadband target network
1989 Swedish Telecom Technical Journal (in Swedish)-TELE no. 2/89, English version to be published

A modified leaky bucket algorithm for data flow access control in ATM Networks
1989 GLOBECOM '89

A resource allocation framework in B-ISDN
1990 Session A2, ISS 90.

An ATM -based multi-link extension for the IBCN
1991/07 Australian Broadband switching and services symposium '91

An ATM switch: Implementation-Technique and Technology
1990 Session A5 ISS 90

An open architecture for integrated broadband communications
1990/10 IEE Conference on Integrated Broaband Services and Networks

ATM technology development in RACE
1991 GLOBECOM 1991

Early application of broadband communications technology
1991/07 IEEE Communications Theory Workshop

Fault tolerant ATM switch network
1991/07 Australian Broadband switching and services symposium '91

Flow Enforcement Algorithms for ATM Networks
1990 ISS 90

Flow enforcement algorithms for ATM networks
1991/04 IEEE Journal on selected areas in telecommunications Vol 9, No. 3

Integrated Demonstrator on a Network level
1989 Swedish Telecom Technical J.-TELE No.2/89

Link capacity allocation in ATM broadband communication networks
1990 GLOBECOM '90 Conference

Load Control in ATM Networks
1990 Session A8, ISS 90

Load control in ATM networks
1990/07 Workshop on Traffic and Performance Aspects IN IBCN

Multi-link possibilities in ATM
1991/04 Workshop ATM Network planning and evolution

Obtaining a connection acceptance criterion for ATM nets based on renewal theory
1990/07 Workshop Traffic & Peformance Aspects in IBCN

On the performance of routing algoritms and path control in ATM networks
1992 INFOCOM 92 and for publication in Performance Evaluation' Journal

Performance evaluation of statistical multiplexing schemes in ATM networks
1991/06 Computer Communications journal

Performance improvement of an ATM network by introducing string mode
1991/04 Proceedings of IEEE INFOCOM '91

Policies for congestion avoidance in ATM Networks
1992 INFOCOM 92 and Performance Evalauation Journal

Resources algorithms in a B-ISDN
1990 Session A2, ISS 90

Simulative analyis of optimal resource allocation and routing in IBCNs
1991/04 IEEE Journal on selected areas in communications, Vol 9, No. 3

Statistical multiplexing of identical bursty sources in an ATM network
1988 Proceedings GLOBECOM '88, paper 39.6

Stratified Reference Model: an open architecture approach for B-ISDN
1990 Poster session, ISS 1990

String mode - a new concept for performance improvement of ATM networks
1992 IEEE Journal in selected areas in communications, Q1

String mode performance evaluation
1990/07 Workshop Traffic & Performance Aspects in IBCN

Techno-economic evaluation of the transition to broadband networks
1990/10 IEE Conference on Integrated Broadband Services and Networks

R1015 Domestic Customer Premises Network

ATM - Teilnehmer fuer integrierte Breitband - Kommunikation
1989 Nachrichten Technishe Zeitschrift (NTZ)

Designing the user-interface for home networks
1989/09 International Symposium Human Factors in Telecommunications HFT'90

Domestic Customer Premises Networks
1989/01 Workshop on European Standardisation organised by CENELEC

R1017 IBC On-Line Environment

An On-line environment for future broadband telecommunication systems
1990/11 4th RACE TMN conference

I.B.C.N:Design Issues
1989/10 Intecs Sistemi S.p.A. 18/9/89;Position Paper ESTEC Workshop on Comm. Netw.and Distributed

On-line data extension
1989 ANV Technology Review 1989

The automatic deduction of strategies for on-line software extension
1989/07 Conference Paper 7th Int. Conf. on Software Engineering for Telecom.Switching

R1018 High Quality Videotelephone and (High Definition) Television

2 Layer Coding Schemes Based on H. 261 for ATM Networks
1990/03 Third International Workshop on Packet Video

A flexible architecture for the transmission of television programmes over 34/35 Mbit per channels
1991 Picture Coding Symposium 91

A hardware realisation of an adapted H.261 type codec for use on an ATM network
1989 Picture Coding Symposium 89

A HDTV Compatible coding scheme for distribution purposes
1991 Proceedings of the fourth HDTV Workshop

A predictor I.C. for TV and HDTV Codecs Using Motion Compensation
1991/09 4th International Workshop on HDTV and Beyond

A promising solution to the TV-HDTV compatible coding
1989 Picture Coding Symposium 1989

A Simple Measuring Method for Electro-optic Coefficients in Poled Polymer Waveguides
1989 Appl. Phys. Lett. Vol. 55

Adaptive prediction for high quality television transmission coding based on the LMS algorithm
1988 Picture Coding Symposium PCS'88

Adaptive prediction for high quality television transmission coding based on the LMS algorithm
1989/08 SMPTE Journal

An ATM adapted Video Coding algorithm operating at low bitrates
1989/09 Second International Workshop on 64 kbit/s Coding of Moving Video

An ATM adapted video coding algorithm using knowledge based techniques
1990/09 Proceedings of EUSIPCO'90

Arithmetic Coding - an alternative VLC strategy for video coding
1989/07 Proceedings of IEE conference on Image Processing and its applications

Aspects de la transmission numerique des signaux TVHD
1990/11 Symposium franco-espagnol

Bitrate optimisation for fixed picture transmission with an ATM adapted CCITT H.261 algorithm
1990/07 Bilkent International 1 Conference on new trends in Communications

Broadband video communications : the constant quality coding question
1990/10 International Conference on Integrated Broadband Services and Networks

Coding of Model Failures in Facial Regions Using a Dynamic
1991/09 Proceedings of the 1991 Picture Coding Symposium Tokyo

Comparison Between Several two Layer Schemes for ATM networks
1991/08 Fourth International Workshop on Packet Video

Compatible Coding of digital TV and HDTV
1990/11 Second International Workshop on digital video communication

Compatible Coding of Television images - Part 1 Coding Algorithm
1990/10 Image Communication Journal, spoecial issue on MDTV

Compatible Coding of Television images - Part 2 Compatible System
1990/10 Image Communication Journal, special issue on MDTV

Compatible motion compensated subband coding
1991 Picture Coding Symposium 91

Compatible solutions for TV and HDTV Transmission
1989/06 Broadcast Sessions, 16th International TV Symposium and Technical Exhibition

Constant Quality Coding in ATM networks : from Videophone to HDTV
1989/10 RACE workshop on Technology for ATD

Customized wire frame modelling for facial image coding
1990 3rd International Workshop on 64 kbit/s Coding of Moving Video

Design of subband filters with finite wordlenght coeffficents
1990/02 Fourth International Workshop of HDTV and beyond

Digital picture processing for the transmission of HDTV - The progress in Europe
1991/07 SPIE Conf.

Extension of CCITT Visual Communication Coding algorithm for operation in ATM networks
1990/04 Image Communication Journal

HDTV digital Codec based on a field skip approach
1989/08 3rd. International Workshop on HDTV

High quality still picture mode embedded into a hybrid coding scheme
1990/03 Picture Coding Symposium '90

In-Band interpolation applied to motion compensated subband coding
1991/02 Fourth international workshop on HDTV and beyond

Object oriented motion estimation and segmentation in image sequences
1991 Image Communication 3

Object Oriented Segmentation, Motion estimation and modeling of Image Sequences
1989/09 Second Int. Workshop on 64 Kbit/s Coding of Moving Images

Progress in Digital Video and its Impact for Cable TV
1991/06 Symposium International de Television

Progress in segmentation and hierarchical coding of perceptually significant regions
1990 3rd International Workshop on 64 kbit/s Coding of Moving

Segmentation and modelling of head and shoulder scenes
1990/09 3rd International Workshop on 64 kbit/s Coding of Moving Video

Segmentation and motion estimation in image sequences
1990/02 SPIE/SPSE Symposium Electn Imaging conf: Sensing & Reconstruction of 3-dimensional objects &

Segmentation of moving head-and-shoulder shapes
1990/03 Picture Coding Symposium Cambridge, MASSACHUSSETTS USA

Single Chip Motion Estimator for Video Codec Applications
1989/07 Proceedings of IEE Conference on Image Processing and its Applications

Two-layer video coding for ATM networks
1991/03 Image Communication Journal

Two-layers constant quality video coding for ATM environments
1990/10 Visual communications and image processing '90

Two-layers Knowledge Based Videophone Coding
1990/09 Third International Workshop on 64 kbit/s Coding of Moving Video

Various aspects of HDTV digital transmission
1990/11 Image COM 90

R1019 Polymeric Optical Switching

A model for poling by an electric field of acceptor-donor molecules in a liquid crystalline Phase
1987 SPIE proceedings, vol 866

A simple measuring method for electro-optic coefficients in poled polymer waveguides
1989 Applied Physics, Letters, vol 55

Construction of the second order optical nonlinearity of an Organic Polymer
1989 SPIE proceedings, vol 1126

Developments in high-temperature stable nonlinear optical polymers
1990 Technical Digest on Integrated Photonics Research

Electro-optic measurements in poled polymer films
1990 Proceedings SPIE 1337

Measurements of electro-optic coefficients in novel side-chain polymers
1989 SPIE proceedings, vol 1126

Monolithic integration of a GaAs/AlGaAs laserdiode and a polymeric channel waveguide
1989/09 ECOC'89, paper PDB-4

New backbone to electro-optics
1990/04 Physics World

Optically non-linear polymers in guided wave electro-optic devices
1989 Technical Digest Series, vol 2

Optically nonlinear polymeric switches and modulators
1990 Proceedings SPIE 1337

Organic Polymers as Optically Nonlinear Media
1988 SPIE proceedings, vol 971

Perspectives for optically non-linear polymers in electro-optic applications
1989 Organic Materials for Non-linear Optics R A Hann & D Bloor eds., Society of Chemistry

Photoinduced channel waveguide formation in nonlinear optical polymers
1990 Electronics Letters, vol 26

Polymeric Channel Waveguide Modulators
1989 Proceedings 15th European conference on Optical Communication

Polymeric guided wave optics
1989/09 SPIE OE/FIBRES, paper No 1177-09

Polymeric optical waveguide switch using the thermo-optic effect
1989 Journal of Lightwave Technology, Vol 7, No 3, 449

Polymeric optically nonlinear modulators and switches
1990 Technical Digest on Integrated Photonics research

Recent developments in LiNbO3 and Electro-optical Polymer Based Devices
1989/07 MOC/GRIN, paper L1

Recent developments in Optically Non-linear Polymers and related Electro-optic Devices
1989 Proceedings SPIE 1147

R1020 HYBRID

All-Optical Switching Based on Semiconducting Polymers
1991 Materials for photonics devices, p 294, A d'Andrea, A Lapiccirella, G Marletta and S Viticoli eds.,

Briefringence control and dispersion characteristics of silicon oxynitride optical waveguides
1991 Electronics Letters, 27

Caratterizzazione di un film di Langmuir-Blodgett come guida di luce
1989 Santa Margherita

Characterization of a Langmuir-Blodgett film waveguide by a four=layer structure
1989 Proc. SPIE vol. 1141, p. 37

Diode laser waveguiding in polydiacetylene films
1990 Electr. Lett, 26

Efficient degenerate four wave mixing in Poly (3BCMU) waveguides
1990/10 Electron. Letters 27, 1327

Experimental study of Photoablation of polydiacetylene films
1989 J. Molecular Electronics Vol. 5,113

Infrared waveguiding and photodamage in polydiacetylene films
1990 International J of Optoelectr., 5

Langmuir Blodgett films for waveguide nonlinear optics
1991 Materials for photonics devices, p. 276, A. D'Andrea, A. Lapiccirella, G. Marletta and S. Viticoli

Linear and Nonlinear waveguiding in Rhodamine doped Epoxy films
1990/09 J. Opt. Soc. Am. B8

Lower Power optical bistability and phase conjugation in polydiacetylene
1988 J. Physique C2, Suppl. 6, Tome 49, 85

Multiphoton nonlinear interactions in conjugated organic polymers
1990 Synthetic Metals, 37

Nonlinear optical properties of organic polymers - origins and nature
1991 Proceedings of OMNO '90

Nonlinear optical studies of Transition Metals Containing Conjugated Organic Monomeric and Polymeric
1991 Organic materials for Nonlinear Optics and Photonics, NATO ASI Series

Nonlinear waveguiding and degenerate four wave mixing in Rhodamine doped Epoxy films
1991 Proceedings of OMNO '90

Optical Nonlinearities of Conjugated Polymers - Principles and Applications
1988 Proceedings of the 1st International Conference on "Electrical, Optical and Acoustic properties of

Optical Processors based on whispering propagation
1989 IOOC '89 Tech. Digest, p3-128, KOBE

Photoablative etching of Langmuir-Blodgett Films
1989 Thin Solid Films

Photoablative etching of materials for optoelectronic integrated devices
1990 SPIE Vol. 1377, Eximer Laser Materials

Resonent enhancement of the near infrared nonlinear optical susceptibility of organic polymers
1991 Synthetic Metals

Simple setup for rapid testing of third-order nonlinear optical materials
1990/01 Appl. Optics Vol. 29

Three-photon enhanced optical nonlinearity of Poly (3-Butylthiophene)
1989 Synthetic Metals 32

R1021 A Re-usability Infrastructure for Software Engineering

A Field Trial Of Broadband Services and Networks in Spain
1989 NETWORKS 89

A New Multiplex Process For The Future Of Broadband ISDN
1988/08 EBU Review - Technical, No. 230

A Sequence Charts Tool for Reusing Requirements in Telecommunications Domain
1991/03 TOOLS'91, Technology of Object-Oriented Languages and Systems, 4th Intnal Conf. & Exhibition

A simple call acceptance procedure in an ATM Network
1989 ITCS Seminar

A technical presentation on the ARISE project
1990 The Greek Computer Society

Article on ARISE
1989 Portuguese PTT Technical Journal

Aspects to the ARISE Project
1990 The Telecom Ireland Technical Journal

ATD - Ein Neues Multiplexverfahren Fuer Das Zukunftige Breitband - ISDN
1988/11 Fernseh - U. Kino-Technik, Vol. 42

ATM And Its Challenges To VLSI
1989 Proceedings COMPEURO'89

Banyan Networks In An ATM Environment
1988 Proceedings of the International Conference on Computer Communications

Behaviour Extension for CSP
1991/10 VDM '91 Symposium

Broadband Access To ISDN
1989/04 Proceedings of IFIP TC6/ICCC Joint Conference on ISDN in Europe

Buffering Concepts For ATM Switching Networks
1988 Proceedings of the IEEE Global Telecommunications Conference (GLOBECOM '88) Hollywood,

Burst Detection
1989/08 NTS8

CASE for Telecomms Players
1992/12 Toulouse 92

Change Management
1990 Software Engineer's Handbook

Chapter on Change Management
1991/03 Software Engineers's Handbook published by Butterworths

Data Translation
1991 Software Engineering Environments

Distribution in ARISE
1991/11 IEE Colloquium on Software Engineering Architectures - London

Einige Anmerkungen Zu Begriffen Und Konzepten Der ATM-Technik
1989/02 Proceedings of Kommunikation in Verteilten Systemen

Evolutionary Support for Distributed Object Oriented Engineering of Telecomms Services
1992/11 2nd IBC Symposium - Paris

From ISDN To IBCN
1989/08 Proceedings of IFIP 11th World Computer Congress

Hood and Z for Development of Complex Software Systems
1990/04 VDM Symposium 1990 : VDM and Z

Human Aspects and Organisational Issues of Software Reuse
1992/05 Chapter in Report : Software Resure and Reverse Engineering in Practice

Label Congestion In ATD Switching Structures
1988 Presentation in COST 202Bis

Mapping Structured Analysis Semantics to Hierarchical Object Oriented Design
1992/12 Toulouse 92

MUSEION - A reuse support system for design of service features
1991/03 International Phoenix Conference on Computers and Communications

Museion - Supporting Reuse-Oriented Software Development
1992/11 2nd IBC Symposium - Paris

Object-Oriented Technologies and Reuse in Telcommunications Applications
1990/06 TOOLS'90, Technology of Object-Oriented Languages and Systems, Second International

On The Use Of Priorities In ATM Switching Structures
1989 ICC '89

Organisational Aspects on Reuse
1990/03 The Monitor Briefings - Software Reuse : Component Engineering for Software Development

Performance Analysis Of Buffered Banyan Networks
1988 Proceedings of the International Seminar on Performance of Distributed and Parallel Systems

Quality of Software and the ARISE Development Platform
1992/11 European Conference on Software Quality - Madrid

Rebuild : Pragmatic Approach in Design of Telecommunications Software
1992/11 2nd IBC Symposium - Paris

Report to ARISE project
1989 Telecom Eireann (Irish PTT) Technical Journal

Requirements for and Infrastructure to support IBC Software Development
1992/11 2nd IBC Symposium - Paris

Reuse in Telecommunications System Development
1990/11 Eureka Software Factory Workshop

Reuse in the telecommunications domain using object oriented technology and Ada
1990/06 Seventh Washington Ada Symposium

Service Extension at the Specification Level
1990/12 5th Z User Meeting

Software Engineering for IBC towards a Reuse based Approach
1989/07 SETTS'89 - Proceedings of 7th Intnal Conf. on Software Engineering for Telecom. Switching

Subscriber Premises Network (SPN) For Broadband ATM Networks
1989/06 The Annual National Electronics Convention

Successful Management Structures for Reuse
1992/06 Chapter in Report : Integrated Software Reuse : Management Techniques

Televerket Technical Magazine
1989 Complete issue devoted to RACE participation with a major article on the ARISE project.

The ARISE Change Management System
1991/09 British Computer Society Reuse Special Interest Group Conference

The ARISE Contribution to Software Development
1990/11 Eureka Software Factory Workshop

The ARISE Process Modelling System
1991/03 Software Engineering Environments 1991, University College Wales, Aberystwyth

The ARISE Process Modelling System, Software Engineering Environments
1991 G.M.T.

The ARISE Publishing System
1992/11 2nd IBC Symposium - Paris

The Aspect Book
1990 Section on Architectural Issues

The ATM Zone Concept
1988 Globecom '88

The Eclipse Program (Tool Builders Kit)
1990 Proceeding of 1st International Conference on Systems, Development Environments and Factories

The Virtual Path Identifier And Its Applications For Routing And Priority Of Connectionless And
1988 International Journal of Digital and Analog Cabled Systems

There IS an Object Oriented Way
1992/12 Toulouse 92

Turning Research into Reality
1992/11 2nd IBC Symposium - Paris

R1022 Technology for ATD

A basic requirement for the policing function in ATM networks
1992 Comp. networks and ISDN systems

A Burst Level Simulation : A Comparison with Cell Level Simulation and Queueing Analysis
1992/04 9th IEE UK Teletraffic Symposium

A CMOS ASIC to implement the TC sublayer in the physical layer of the ATM network
1992/06 Euro-ASIC 92 - Paris

A comparison of burst-level and cell-level approaches to the simulation of ATM networks
1991/06 13th International Teletraffic Congress: Discussion Circles

A constant Service Time Queue by a Finite State Source
1990/07 ITC-13, Copenhagen 1991

A finite capacity polling system with non-exhansutive service and non-renewal input
1990/03 American Mathematical Society

A General Discrete-Time Queueing Model : Analysis and Applications
1991/06 International Teletraffic Congress

A Generalized Policing Mechanism based on the Leaky Bucket
1990/08 Ninth Nordic Teletraffic Seminar

A High-Speed Universal MicroProcessor Interface for ATM Networks
1991 Proceedings IMACS/IFAC P.D. COM - Corfu, Greece

A simple Call Acceptance Procedure in an ATM Network
1989 ITC Specialist Seminar, Adelaide

A simulation study of buffer occupancy in the ATM access network: are renewal assumptions justified?
1991/06 13th International Teletraffic Congress

A versatile ATM Switch concept
1990/05 XIII International Switching Symposium

AAL protocol model for signalling packet mode connection oriented service & connectionless service
1989/10 3rd R1022 TC workshop

Access architectures for broadband ATM networks in the business community
1991/04 The International Symposium on Subscriber Loops and Services

Access Network for Residential Customers in an ATM network
1992/01 IFIP TC6 Workshop on Broadband Communications - Estoril

An Efficient Parallel Adaptor for Computer Interface to ATM Network
1991 Proceedings IMACS/IFAC P.D. COM - Corfu, Greece

Analysis of Variable Cell Delays in ATM Networks
1992/08 10th Nordic Teletraffic Seminar - Aarhus

Approaches to simulation of ATM networks and exchanges using distributed processing techniques.
1990/10 International Conference on Integrated Broadband Services and Networks

Architecture and Techonology for a flexible ATM Switch Element and Network
1990/03 1990 International Zurich Seminar on Digital Communications

Asynchronous Transfer Mode, why and how
1990 Blenheim OnLine '90

ATM Adaptation Layer (AAL) Protocols for Signalling
1991 Journal of Computer Networks and ISDN Systems

ATM Adaptation Layer Protocols and IEE LAN Interconnection
1990/10 IEEE Transactions on Communications (to be published)

ATM reference traffic sources and traffic mixes
1990/07 Proceedings BLNT Workshop

ATM Switches - Basic Architectures and their Performance
1989/10 International Journal of Digital & Analog Cabled Systems, Vol. 2, N°4

ATM-A transfer concept not only for broadband services
1990/06 Philips Telecommunication and Data Systems Review, Vol. 48

B-ISDN end to end network delay and requirements for echo control
1992/01 Proceedings of the IFIP Workshop on Broadband Communications - Estoril - p 229-237 - North

Banyan Networks in an ATM-Environment
1988/10 Proceedings of the International Conference on Computer Communication

Broadband Access to ISDN
1989/04 IFIP TC6/ICCC Joint Conference on ISDN in Europe, Proceedings, North Holland (invited paper).

Broadband ATM local networks : evolution and distribution
1990/10 Proceedings of the IEE International Conference

Buffering Concepts for ATM Switching Networks
1988/11 Proceedings of the IEEE Global Telecommunications Conference (GLOBECOM), paper 39.3

Burst Detection
1989/08 Eighth Nordic Teletraffic Seminar

Burst-level teletraffic modelling and simulation of broaband multi-service networks.
1990/04 Seventh UK Teletraffic Symposium

Burst-level teletraffic modelling: applications in broadband network studies
1991/03 Third IEE Conference on Telecommunications

Cell level network simulation using MICROSIM
1991/05 Third Bangor Symposium on Communications

Cell level statistical multiplexing in ATM networks, analysis, dimensioning and call acceptance control w.r.t.
1990/07 RACE BLNT workshop

Cell traffic characterization in a B-ISDN according to the slotted ATD model
1989/10 3rd R1022 TC workshop

Cell-Level Statistical Multiplexing in ATM Networks : Analysis, Dimensioning and Call-Acceptance Control
1990/07 RACE Workshop on Traffic and Performance Aspects in IBCN

Cell-Level Statistical Multiplexing in ATM Networks : Analysis, Dimensioning and Call-Acceptance Control
1990/10 7th ITC Seminar

Cell-Level Statistical Multiplexing in ATM Networks : Analysis, Dimensioning and Call-Acceptance Control
1991/06 13th ITC

Cell-level Statistical Multiplexing in ATM Networks : Analysis, Dimensioning and Call-Acceptance Control w.r.t.
1990/05 IEEE Transactions on Communications

Characterisation of variable rate video codecs as autoregressive moving average processes for ATM networks
1991/03 Third IEE Conference on Telecommunications

Characterisation of variable rate video codes in ATM to a GMDP model
1991/06 13th International Teletraffic Congress

Characterisation of video codecs as autoregressive moving average processes and related queueing system
1990/07 RACE BLNT workshop

Characterisation of video codecs as autoregressive moving average processes and related queueing system
1990/07 IEEE JSAC Teletraffic Analysis of ATM Systems

Comparative Performance Study of Space Priority Mechanisms for ATM Networks
1990/06 Proceedings IEEE INFOCOM'90

Comparison of Policing Mechanisms for ATM Networks
1989/10 RACE 1022 workshop

Design of A Single-Chip ATM Switching Element
1990/11 Proceedings International Conference on Computer Communication (ICCC)

Efficient Implementation of the Lower Protocol Layers in High Speed B-ISDN Data Terminal Adapters
1993 ICC '93 - Geneva

Experiment Preparation for the RACE ATM Technology Testbed, Traffic Performance Aspects
1992/01 2nd RACE Workshop on Traffic and Performance Aspects in IBCN - Aveiro, Portugal

Fast Analysis of On-Off Heterogeneous Traffic Multiplexing with Fluid-Flow Models and its applications to ATM
1992/01 2nd RACE Workshop on Traffic and Performance Aspects in IBCN - Aveiro, Portugal

Flexibles ATM-Koppelfedkonsept fur die Breitbandkommunikation
1990/11 NTZ, Vol. 43, nr. 11

From ISDN to IBCN
1989/08 IFIP 11th World Computer Congress. Proceedings, North Holland (invited paper).

High quality audio and video signal transmission in a broadband ISDN based on ATD - The problem on cell
1990/06 Proceedings of the international Telecommunications symposium

Influence of Variable Cell Delays on UPC
1992/08 10th Nordic Teletraffic Seminar - Aarhus

Introduction Strategies for ATM
1991/01 IEE Colloquium on Fast Packet Switching

Issues in the planning of broadband ATM networks
1991/03 Third IEE Conference on Telecommunications

Jitter and bandwidth enforcement
1991 Proceedings Globecom 91

Konzept zum Anschluss existierender Endgeraete an ATM-Netze
1992/09 37th International Scientific Colloquium - Technische Hochschule Ilmenau

Measurement and ARMA model of video codecs in an ATM environment
1991/06 13th International Teletraffic Congress

Minimizing the loss of non-blocking tandem buffer stages
1990 Computer Networks and ISDN Systems, Vol.20

Minimizing the loss of non-blocking tandem buffer stages
1989 Proc. ITC Specialist Seminar

Modelling and Performance Comparison of Policing Mechanisms for ATM Networks
1991 IEEE Journal on Selected Areas in Communications, Special Issue on Teletraffic Analysis of ATM

Multi-service bandwidth allocation in ATM
1991/04 IEE Eight UK Teletraffic Symposium

Peak rate enforcement in ATM networks
1992/05 INFOCOM 92 - Florence

Performance Analysis of Buffered Banyan Networks
1991/02 IEEE Transaction on Communications, Vol. 39, N° 2

Performance analysis of the discrete time multiserver queueing system GEO/D/c/K
1990/07 RACE BLNT workshop

Performance Assessment of an ATM self-routing switching network using parallel programming techniques and
1991/11 Proceedings int. conf. on comp. and commun. (ICCC '91) - Bejing

Performance Comparison of Routing Strategies in ATM Switch Fabrics
1991/06 International Teletraffic Congress

Performance Evaluation of Adaptation Functions in the ATM environment
1990/07 IEEE Transactions on Communications

Performance evaluation of an M/1-stage in an ATM switching element
1990/03 Proc. First ORSA telecommunications SIG Conference

Performance evaluation of source dependent congestion control procedures in ATM networks
1991/09 Int. Conf. on Networks - Singapore

Police functions in ATM networks
1989/08 8th Nordic Teletraffic Seminar

Policing Mechanisms for ATM Networks - Modelling and Performance Comparison
1990/10 Proceedings 7th ITC Seminar

Priority Management in ATM Switching Nodes
1991 IEEE Journal on Selected Areas in Communications, Special Issue on Teletraffic Analysis of ATM

Priority studies in RACE 1022
1990/07 Workshop on Traffic & Performance Aspects of IBCN

Protocol Reference Model for ATM
1989/10 3rd R1022 TC workshop

Queueing Models for ATM Systems - A Comparison
1990/10 Proceedings 7th ITC Seminar

RATT : A vision of an ATM future IEE
1992/08 Electronics & Communication Engineering Journal

Renewal theory validation of burst level technique for ATM simulation
1992/01 Electronics Letters Vol 28, No 2, pp 106-107

Report on the ITC specialist seminar :Traffic Theories for New Telecommunication Services
1989/11 Philips Research Technical Note

Resource allocation in ATM-networks
1989/08 8th Nordic Telegraffic Seminar

Routing and Resource Allocation in ATM-networks
1990/08 9th Nordic Teletraffic Seminar

Service coding for broadband services
1989/10 3rd R1022 TC workshop

Signalling and ATM in the Age of Mobility
1989/10 3rd R1022 TC Workshop

Some results on traffic control and resource allocation in ATM networks
1990/06 Proceedings NATO-Adv. Res. Workshop Architecture & Performance Issues of High Capacity

Source Independent Call Acceptance Procedures in ATM Networks
1991/04 IEEE JSAC Special Issue on Teletraffic Analysis of Communications Systems

Source models and applications for video
1992/01 2nd RACE Workshop on Traffic and Performance Aspects in IBCN - Aveiro, Portugal

Source policing of video traffic within ATM networks
1991/09 IEE Conf. on digital processing of signals in telecommunications - Loughborough University -

Space priority mechanism with bursty traffic
1991/09 Proceedings int. conf. on the perf. of distributed systems - Kyoto

Statistical Multiplexing advantages of ATM
1989/10 RACE 1022 Workshop, Paris

Statistical multiplexing gain using space priority mechanisms
1991 Globecom 91

Statistical Multiplexing of Sporadic Sources - Exact and Approximate Performance Analysis
1991/06 International Teletraffic Congress

Strategies for Interconnecting HSLANs to B-ISDN and their Performance
1990/11 Proceedings International Conference on Computer Communication (ICCC)

Switching blocks in ATM. Some results concerning architecture and traffic assumptions.
1990/08 9th Nordic Teletraffic Seminar

Switching network architecture for ATM based broadband communications
1990/05 XIII International Switching Symposium

Technology for Broaband Switching
1990/11 Electrical Communication, Volume 64, No 213

Terminal Adaption im ATM-Breitbandnetz
1992 Telekom Praxis '92

The effect of Arranging of Shaping of Individual VC's in ATM Networks
1992/08 10th Teletraffic Seminar - Aarhus

The functionality of the ATM Adaptation Layer
1990 Proceedings of the IFIP TC6 International Conference on Information Network and Data

The Impact of Time Series and Counting Process Approach to Video and Queueing Analysis
1992/04 9th IEE UK Teletraffic Symposium

The modelling of video bearing asynchronous transfer mode exchanges using transputers.
1990/04 7th UK Teletraffic Symposium

The Policing Function in ATM Networks
1990/05 Proceedings International Switching Symposium (ISS)

The space-controller : Architecture and first assessment
1992 Proceedings workshop on broadband commun. - Estoril

Traffic control parameters for video sources in ATM networks
1991/09 6th International Conference on Digital Signal Processing in Communications

Traffic control parameters for video sources in ATM networks
1991/09 6th International Conference on Digital Signal Processing in Communications

Traffic experiments in ATM and requirements on test equipment.
1989/08 8th Nordic Teletraffic Seminar

Traffic mixes on broadband ATM link
1991/07 Electronics Letters, Vol. 27, No. 15

Traffic Studies on Policing Functions and Congestion Acceptance Control in RACE 1022
1990/07 BLNT RACE Workshop, Muenchen

Transmission concept for multipoint operating networks based on ATM
1991 Proceedings Australian Broadband Switching and Services Symposium - Sidney '91 - Vol 2 p 64-70

Variable rate video signals characterisation using a GMP model
1990/04 Seventh UK Teletraffic Symposium

R1023 BEST

BEST Method for Requirements Capture and Functional Specification
1989/07 IEE SETSS'89

BEST Method for requirements Capture and Functional Specification
1989/10 SDL Forum '89

BEST Method for Requirements Capture anf Functional Specification
1989/12 International Workshop On Software Engineering and its applications

R1024 NETMAN - Functional Specification for IBC Telecommunications

Analysis of Network Management Requirements
1990/11 Guideline TMN Conference Proceedings

Functional Description of Network Management
1992/09 British Telecom Research (Ipswich UK) - 6th RACE TMN Conference - Madeira

Generic Information Models for Communications Management
1991/11 Fifth RACE TMN Conference in London

IBCN Maintenance
1991/11 Fifth RACE TMN Conference in London

Object Modelling in RACE TMN
1992/09 GEC Hirst Research Centre London - 6th RACE TMN Conference - Madeira

Object-Oriented Modelling for Quality of Service and Network Performance
1991/11 Fifth RACE TMN Conference in London

OSDL Model of Network Management Architecture
1990/11 Proceedings of the Fourth RACE TMN Conference

QOS in Broadband Communications
1990/10 IEE Conference on Broadband Communications and Integrated Services

Telecommunications Management Conceptual Methods
1992/09 6th RACE TMN Conference - Madeira

R1027 Integrated Opto-electronics towards the Coherent Multichannel IBC

1.5 μm high gain polarisation insensitive semiconductor travelling wave amplifier with low driving current
1990/01 Electronics Letters, Vol. 26, No 2

1.5 μm Monolithic Sources for Coherent Applications
1990/09 OTOLEC Congress

1.55 μm laser on (110) InP by GSMBE
1991/04 2nd Conference on InP and related Compounds

2.5 Gbit/s DPSK system experiment using an optical amplifier as phase modulator
1991/09 ECOC-IOOC '91

3 dB couplers integrated in InGaAlAs/InP
1990/09 ECOC'90

4-Channel InGaAs/InP transimpendance optical receiver array OEICs for HDWDM applications
1990/09 ECOC'90

A balanced dual detector optical hybrid receiver for 140Mbit/s heterodyne system
1990/01 OFC '90

A novel multichannel grating demultiplexer receiver for HDWDM single mode fibre optic system
1989/09 ECOC '89

A polarisation convector on <110> InP
1990/03 SIOE'90

A Three Electrode DFB Wavelength Tunable FSK Transmitter at 1.53
1989 IEE Electronics Letters. 2545

A trackbale above thresold model for the design of DFB and phase-shifted DFB lasers
1991/04 IEEE Journal of Quantum Electronics, Vol 27, No. 4

A wideband monolithically integrated InGaAs PIN/InP JFET transimpedance optical receiver by selective ion
1989/09 ECOC '89

All active multi-section lasers for high power single mode operation
1990 ECOC'90

Amplificateur a semiconducteur insensible a l'Etat de polarisation
1990/03 3ème Journees Nationales Micro-OptoeÇlectronique III-V

An efficient 45o. Polarisation convector on (110) InP
1991/02 OFC 91

Angled Facet amplifiers with low reflectivity and high coupling efficiency
1990/08 IEEE Topical Meeting on Optical Amplifiers

Automatic gain and power control of semiconductor laser amplifiers
1990/09 ECOC'90

Automatic gain control of semiconductor laser amplifiers
1990/05 Techn. Digest of CLEO

Balanced Optical Mixer integrated in InGaAlAs/InP for coherent receivers
1990/09 SPIE OE/FIBERS '90

Carrier induced differential refractive index and detuning effect in GaInAsP SCMQW lasers with 3, 5, and 9
1990/09 12TH IEEE International Semiconductor Laser Conference

Carrier induced differential refractive index in GaInAsP/GaInAs Separate Confinement Multi-Quantum Well
1990/09 IEEE Photonics Technology Letters, Vol 2, No. 9

Characterisation of high speed phase modulators based on optical amplifiers
1991/07 Second topical meeting on Optical based on optical amplifiers and Their Applications

Coupling between angled facet amplifiers and tapered lens-ended fibers
1991/01 IEEE Jour lightw. Techn., Vol 9

Crosstalk and Intermodulation distortion in 1.5 μm laser amplifiers
1989/07 IOOC

CSELT activity in Optoelectronic Integration for coherent system distribution network
1989/01 OCTIMA Rome

Defect Structure of InxGa1-xAs/GaAs Grown on Misoriented (100) Silicon by Molecular Beam Epitaxy
1989 Materials Letters 8

Demonstration of Polarisation Independent Coherent Transmission by Synchronous Intra-Bit Polarisation
1991/06 ICC '91

Design and realization of polarization insensitive semiconductor optical amplifiers with low forward current
1990/08 IEEE Topical Meeting on Optical Amplifiers

DFB Lasers at 1.5 μm grown by GSMBE
1989 Journal of Crystal growth, Vol 95, No. 1-4

Dynamics on DFB semicondutor laser amplifiers
1991/07 Second Topical Meeting on Optical Amplifiers and Their Applications

Electro-optic Polarisation Convector on (110)InP
1990/09 Electron. Letters, Vol 26, No. 19

Etat de l'art sur les amplificateurs optiques
1990/11 XI Journees Nationales d'Optique Guidee

Experimental Determination of Carrier Induced Differential Loss in a 2-Section GaInAsP/InP Laser Waveguide
1989/11 Electronics Letters, Vol 25, No 24

Extremely Low Threshold Butt-Jointed DBR Lasers
Electronics Letters

Fabrication and Assessment of butt-coupled active/passive interfaces for 1.5 μm DFB lasers
1990/09 12th IEEE International Semiconductor Laser Conference

Fabrication and performance of 1.5 μm angle facet laser amplifiers
1988 IEEE International Laser Conference

Fabrication and Performance of 1.5 μm GaInAsP BH travelling wave amplifers with multilayer coatings
1990/03 Semiconductor and Integrated Opto-Electronics

Fibre based components for polarisation diversity receiver networks
1989/01 OCTIMA Rome

Filling up the Fibre - Experimental work towards Optical Coherent Multichannel Systems
1989/04 Second IEE National Conference on Telecommunications, York - (Parallel work complementary to

Four-channel FDM Transmission Experiment at 565 Mbit/s a Semiconductor Optical Amplifier
1990/09 ECOC'90, paper WeG2-3

Future of monolithic Optical Sources for Coherent Applications
1989/06 Proceedings of EFOC-LAN

Gain and noise characteristics of a 1.5 μm near-travelling wave semiconductor laser amplifier
1989 Electronics Letters, vol. 25

Gain ripple minimisation and higher order modes in semiconductor optical amplifiers
1989 Electronic Letters, Vol. 25, No. 12

Gain, saturation and noise figure of a travelling wave semiconductor optical amplifier
1990/11 QOC, PARIS

Growth of InxGA1-xAs on Silicon by Molecular Beam Epitaxy
1989/03 Materials Letters 7 (12)

High Gain at 1553 nm In Er-Doped Fibre Amplifier Pumped by Semiconductor Lasers
1990/09 ECOC'90

High performance 10 degree angle facet laser amplifier
1990/09 12TH IEEE International Semiconductor Laser Conference

High performance single and multi-section 1.5 μm multi-quantum well distributed feedback lasers
1990/09 ECOC'90

High speed and coherent transmission components
1990/09 ETT, VOL 1, No. 5

High speed and high density wavelength multichannel butt-joined DBR lasers
1991/09 ECOC-IOOC '91

In-Line semiconductor optical amplifiers
1991/09 ECOC - IOOC '91

Influence of residual facet reflectivity on nonlinearities in semiconductor optical amplifiers
1990/01 Electronics Letters, Vol 27

InP-based integrated optoelectronics in Europe
1990/05 SOTAPOCS

Integrated Optical Receivers for Communication Applications
1990/07 Summer School on Optical Communications

Integration yields opto-electronic components for the 1990s
1989/09 Laser Focus World

Interferometric Determination of the Linewidth Enhancement Factor of a 1.55 μm GaInAsP Optical Amplifier
1991/02 Applied Physics Letters, Vol. 58, no. 8

Intermodulation Distortion and Crosstalk in Cascaded Laser Amplifiers
1990/08 IEEE Topical Meeting on Optical Amplifiers

Intermodulation distortion due to optical amplifiers in multichannel systems
1989/09 ECOC '89

L'integrazione di dispositivi optoelettronici per sistemi multicanale in ottica coerente
1990 L'Informazione Elettronica

Laser 1,5 µm a reflecteur de BRAGG distribue accordable en longueur d'onde
1990/03 3ème Journees Nationales Micro-Optoelectroniques II-V

Linear InGaAs PIN photodiode arrays for HDWDM applications
1989 EFOC/LAN '89

Low Capacitance Lateral Interdigitated InGaAs Pin Detectors for 1.3 - 1.55 µm Applications
1989/03 SIOE

Low reflectivity angled facet laser amplifiers
1989 LEOS Annual Meeting '89

Low residual reflectivity of angled-facet semiconductor laser amplifiers
1990/08 IEEE Photonics Techn. Lett., Vol 2, No. 8

Low threshold 1.5 µm DFB laser grown by GSMBE
1989 Electronics Letters, Vol. 25

Low-Loss 3 cm long InP/GaInAsP Rib Waveguides
1989/04 5th European Conference on Integrated Optics (ECIO '89)

Measurements of the Sensitivity of a Tunable Multi-electrode DFB Laser to Optical Feedback
1989 ECOC '89

Medium rate narrow deviation CPFSK system using a broad linewidth MQW-DFB laser and a new discriminator
1991/09 ECOC-IOOC '91

Model of effective bandwith applied to a saturated near travelling wave optical amplifier
1990 SIOE'90

Monolithic integration of a fully ion implanted lateral InGaAs PIN detector/InP JFET amplifier for 1.3 - 1.55 µm
1989/04 Electronics Letters, Vol. 25, No.8

Monolithic integration of a InP/GaAs 4-Channel Transimpedance Receiver Array
1990/08 IEEE Topical Meeting on Optical Amplifiers

Monolithic optical receiver using InP/GaAs Heterojunction FETs
1990/06 IEEE Colloqium on InP materials, devices and ICs

Multi-section DFB modelling taking into account hole burning
1990/09 1990 European Semiconductor Laser Workshop

Multichannel FSK Transmission Experiment at 565 Mbit/s Using Tunable Three-Electrode DFB Lasers
1990/06 Electronics Letters, Vol. 26, No 13

Multichannel Grating Demultiplexer (MGD) Receivers for High Desity Wavelength Multiplexed Systems
1989/07 IOOC

Multichannel Polarisation-Insensitive Coherent Transmission Experiment by Synchronous Intra-Bit Polarisation
1991/09 ECOC-IOOC '91

New laser structure for polarisation insensitive semiconductor amplifier with low current consumption
1991/07 Second Topical Meeting on Optical Amplifiers and their applications Snow Mass

Nuovo Metodo Per La Determinazione Degli Indici Di Rifranzione Efficaci E Delle Perdite Di Guide Ottiche
1991/03 Fotonica '91

On the realization of butt-coupled waveguides by ga-source molecular beam-epitaxy
1991/09 International Conference on CBE, ICCBE-3

Optoelectronic Integration - The key technolgy for optical frequency Multiplex (OFDM) Systems
1990/06 EFOC/LAN'90 Munich

Polarisation diversity fibre networks
1990/09 SPIE OE/FIBERS'90

Polarisation Independent Detection by Synchronous Intra-Bit Polarisations Switching in Optical Coherent
1990 ICC '90

Polarisation Independent FSK Coherent Transmission By Synchronous Intra-Bit Polarisation Spreading
1991/05 CLEO '91

Polarisation Insensitive Coherent Transmission by Synchronous Intra-Bit Polarisation Spreading
1991/02 Electronics Letters, Vol 27, No.4

Practical Limitations on ring laser device performances
1991/03 SIOE 91

Progetto e realizzazione di accoppiatori a 3 dB integrati in InGaAlAs/InP per ricevitori ottici coerenti
1990/10 Riunione Nazionale di Elettromagnetismo Applicato

Recent Advances in Optical Amplifiers
1989/02 OFC '89

Recent progress on TW amplifiers and MQW lasers by GSMBE
1989/09 European Workshop on semiconductor lasers

Reponse en modulation de frequence de laser DFB a 2 electrodes
1990/10 Journees Nationales d'Optique Guidee (JNOG)

Research into Opto-electronic Components
1989 Electrical Communication, Vol. 62. No. 3/4

Semiconductor optical amplifiers and related functional devices
1991/06 EFOC/LAN '91

Signal to Noise Ratio in non-linear Optical Amplification Process
OE/LASE'90 Conference

Single and Multisection distributed feedback lasers: Modelling taking into account hole burning and comparison
1991/09 ESSDERC

Single layer coating for an angled facet amplifier
1989/08 Electronics Letters, Vol. 25

Some numerical results on polarisation insensitive 2-layer antireflection coatings of semiconductor laser diode
1990/08 IEE Proceedings, Vol 137, pt J No. 4

Spectral bistability in multielectrode DFB lasers
1990/04 Photonic Switching'90

Sub-MSub-MHz spectral linewidth in 1.5 μm strained quantum well DFB-brs-ldS
1991/09 ECOC-IOOC '91

Techniques de modulation en transmission coherente
1990/11 Journees Nationales d'Optique Guidee (JNOG)

Technology of low threshold Butt-Jointed DBR lasers
Semiconductor Laser Workshop

Temperature dependent gain and noise of 1.5 μm laser amplifiers
1989 Electronics Letters Vol. 25

The design and assessment of lambda/4 phase shifted DFB laser structures
1989/06 IEEE Journal of Quantum Electronics, Vol 25, No.6,

Theory and practical calculations of antireflection coatings of semiconductor laser diode optical amplifiers
1990/08 IEE Proceedings, VOL. 137, PT J, No. 4

Thermal contribution to wavelength tunability of multielectrode DFB lasers
1991/02 OFC '91

Traitements antireflechissants multicouches pour amplificateurs optiques à semiconducteurs
1989/08 Journees Nationales d'Optique Guidee (JNOG)

Transmissions Coerente Independente Dalla Polarizzazione Mediante Diffusions Sincrona Intra-Bit Della
1991/03 FOTONICA '91, Sirmione

Tutorial on Optical Amplifiers
1990 OFC'90

Waveguide loss and effective indices determination by optical frequency scan of integrated resonant cavities
1990/09 Optical Fibre Measurements

Wavelength switching using 3 electrode DFB lasers
1989/08 Journees Nationales d'Optique Guidee (JNOG)

Wavelength Tuning Analysis and Spectral Characterisitics of Three-Section DBR Lasers
1991 IEEE J. Quantum Electron.

Work at STC Technology Ltd on InP integrated optics and integrated optoelectronics for WDM applications
1990/08 International Conference on Solid State Devices and Materials

R1028 REVOLVE - Regional Evolution Planning for IBC

A role for Telecommunications Policy in EC Regional Development
1989/08 International Telecommunications Society, European Regional Meeting

Advanced Economic Evaluation for Rural Telecommunications Projects
1990/10 IEE Broadband Services & Networks Conference 1990

Broadband Fibre Optic Network in the Less Favoured Europe
1991/06 Annual Congress of the International Federation of Communication Engineers (FITSE) - Strasbourg

GRAPHITE - Graphic Interactive Model for Multi-Service Local Networks Evolution Studies
1991/07 11th European Congress on Operational Research (EURO XI) - Aachen

GRAPHITE - Graphic Interactive Model for Telecommunications Local Networks Evolution Studies
1991/05 14th Urban Data Management Symposium (UDMS) - Odense

Infrastructure Investment Appraisal Using Reference Modelling Techniques
1990/03 8th International ITS Conference

International Telecommunications Society
1989/08 European Regional Meeting - Budapest

Prospects for Broadband in Rural and Peripheral Regions of the EC
1988/09 Conference Proceedings : International Conference on Telecommunications and Economic

RACE Project Revolve, Regional Evolution Planning for IBCN
1990/10 Conference Proceedings : Rural Telecommunications 90

REVOLVE : Evolution Planning for Integrated Broadband Communications in Less Favoured Regions
1991/07 11th European Congress on Operational Research (EURO XI) - Aachen

Rural Telecommunications Strategy & Economics
1990/05 Communic Asia 90

TELECOMMS : RACE in the Regions
1988 European TRENDS 4/88, The Economist Intelligence Unit

Telecommunications and New Economic Opportunities for Europe
1988/09 Conference on Telecommunications and New Economic Opportunities for Europe

The Relevance of Advanced Communications to Rural Revitalisation
1988 ORA Workshop

R1029 Development of Improved InP Substrate Material for Opto-elec.

Crystal defect studies and chemical composition in III-V compounds
1992 Int. Workshop on characterisation of semiconductor substrates and structures - Smolenice,

Crystal perfection and the highest Fe and Si doping level in InP epitaxial layers
1992 Proceedings of the 8th Int. Conf. on SIMS - Amsterdam - p 885 - J.Wiley & Sons

Defect Control in Semiconductors
1989 International Conference on Defect Control in Semiconductors

Detection of Hydrogen, Carbon and Oxygen in GaAs Epitaxial layers by SIMS
1990/04 1st International Conference on Epitaxial Crystal Growth

Direct analytical methods for semiconductor assessment
1992 1st Workshop on expert Evaluation and Control of Compound Semiconductor Materials and

Fe doped semi-insulating InP substrate characterisation for device application
1992 7th Conf. on S.I. III-V Materials - Ixtapa, Mexico

International Report of Thomson-CSF lab. LCR ORSAY
1990 SPIE Conf. Opto. Elect. Appl. Sc. and Eng.

Nanotechnology
1990 Nanotechnology, 1, 54

Quantative analysis by SIMS in Microcaracterisation des solides
1989 Microcaracterisation des solides, Ed. CNRS, by A. Ammou, 422

R1030 Advanced Customer Connections, and Evolutionary System Strategy

1.3 µm Laser diode with microleaved emissive facet, integrated with a monitor photodiode
1990/05 Proceedings OPTO 90 in Paris

ACCESS-a system study of the broadband subscriber loop
1989 IEEE-Special Issue of Journal Lightwave Technology, Vol. 7, No 11

Amplifiers in AM-SCM-CATV-Systems
1991/04 Proceedings Workshop Optical Amplifier

Application of the micro-sheath concept to a whole range of low to high fibre count ulta-lightweight optical
1992/06 EFOC/LAN 92

Cost Analysis of passive optical network using the SYNTHESYS model
1992/09 OLN Workshop - France

Customer Access Connections Projects in RACE : an Evolutionary Approach to Fibre to the Home and the
1990 Proceedings Supercomm ICC 90

Development of Low Cost CAC solutions in the ACCESS project
1990/07 Proceedings of RACE Summer School on Optical Communications

Duplexeur Optique pour liaison bidirectionnelle sur une seule fibre
1990/10 Journees Nationales d'Optique Guidee (JNOG)

Enfibrig ansluning upptyller integrerade kundkomtrav
1989/04 TELE 2/89, Technical Journal off Televerket

Fibre in the local loop. A system study done in RACE project R1030 ACCESS
1990/10 International Conference on Integrated Broadband Services and Switching

Fibre to the Residential Customer
1992 GLOBECOM 92

Gain limit in Er-doped fibre amplifiers due to internal Rayleigh-backscattering
1992 Photon. Techn. Lett., Vol 4, p 559

Integrated optic 1 x 4 splitter in SiO2/GeO2
1989/07 Elec. Lett., Vol. 25 No. 15

Local Area Network : Optical Cable Systems
1989/04 IEE 2nd National Conference on Telecommunications, University of York

Microoptic WDM-Transmitter/Receiver Module for Single Mode Fiber
1989/07 MOC'89 Technical Digest

Multicarrier modulation of single mode lasers - a consistent small theory and its range of validity
1991/03 3rd IEE Conference on Telecommunications - Edingburgh

Optical transceiver module for B-ISDN
1991/03 Proceedings GMD-Fachtagung Mikroeletronik

Plasma Deposition of GeO2/SiO2 and Si3N4 waveguides for integrated optics
1989/08 IEE Proceedings, Vol 33, Pt J. No

RACE Project 1030, ACCESS - A system study of the Broad-Band Subscriber loop
1989/11 J. Lightwave Technology, Vol. 7, No 11

Single Mode Fiber WDM-Unit for Duplex Subscriber Link Using a Substrate with Embossed Alignment Grooves
1989/11 J. Lightwave Technology, Vol. 7, No 11

The B-ISDN Customer ACCESS in an Evolutionary Environment
1990 International Switching Symposium ISS '90

Transceiver Module for Single Mode Fiber Subscriber Link 100C 1989 - Paper 19 B3-16
1989/07 IOOC'89, Technical Digest

Upper gain limit in Er-doped fibre amplifiers due to internal Rayleigh-backscattering
1992 Tech. Digest EFC 92, p 68

Wide Band Analog Photoreceiver
1990/05 OPTO 90 in PARIS

Workshop on Future Network Architecture
1989 Globecom 89

R1031 Low Cost Opto-electronic Components

Design, Manufacture and Performance of REceptable (Connectorised) Laser Diode Packages for 1.3 μm and
1992/05 42nd Electronic Components and Technology Conference - San Diego

Full Electrical Wafer Test of 1.5 μm MQW-DFB Lasers
1992/09 ECOC 1992 - Berlin

High yield, low cost (GaIn) (AsP) ridge waveguide lasers operating at 1.3 Em wavelength fabricated entirely by
1990/06 5th International Conference on MOVPE

InGaAsP/InP laser with monolithically integrated monitor photodiode
1990/03 Conference Proceedings of SIOE '90

InGaAsP/InP lasers with dry etched mirrors
1991/07 Plasma Workshop, Backnang

InGaAsP/InP-Laser mit monolithisch integrierter Rucklichtdiode
1990 ITG-Fachbericht 112, VDE-Verlag GmbH

Integration of transmitter and receiver devices for optical communication
1991/04 ITG-Colloquim Photonic Devices

Laser RIN calibration by extra noise injection
1989/08 Electronics Letters, Vol. 25, n. 16

Realization and Wafer Test of InGaAsP/InP DFB-Laser/Monitor OEICs
1992 IEEE Photonics Technology Letters \$, 250-252

Receptacle & fibre pigtailed coaxial 1300 nm laser sources for local loop and LAN applications
1990/06 Conference Poceedings for Conference EFOC-LAN '90

R1033 OSCAR - Optical Switching Systems, Components & Applications

4 x 4 InP crossbar switch array using the electro-optic and carrier depletion effects
1991 Topical Meeting on Photonic Switching

A 1 x 16 lithium niobate optical switch matrix with integral TTL compatible drive electronics
1991 Integrated Photonics Research 1991, Technical Digest Series (Optic. Society of America)

A 16 x 16 single chip optical switch array in lithium niobate
1991 Electronics Letters, 27/14

A Polarisation independent guided wave LiNbO3 electro-optic switch employing polarisation diversity
1991 IEEE Photonics Technology Letters, Vol. 3, No. 2

A transfer matrix model for the simulation of optical switching networks
1991/05 COST 216 Seminar Modelling of Innovate Optical Networks

A travelling wave semiconductor laser amplifier for simultaneous amplification and detection
1989/02 IGWO'89

Access Cross-connect
1992 European Conference on Optical Communication (ECOC) - Berlin

Analysis of switching employing a 4x4 switch matrix: crosstalk requirements and system proposal
1989/09 ECOC '89, paper WeA15-4

Approaches to polarisation handling in optical switching systems
1990/10 IEE Colloquim on Polarisation effects in Optical Switching systems

Bandfilling or Stark effect for photonic switching: a comparison
1990 Techn. Digest, Topical Meeting on Photonic Switching

Beam Propagation Method Analysis of the Digital Switch
1989/02 IGWO'89

Bidirectional Beam Propagation method
1988 Electronics Letters Vol. 24

Bidirectional BPM analysis of a 90° integrated waveguide mirror in InGaAsP/InP
1989 Workshop on Numerical Simulation and Analysis in Guided wave Optics & Optoel.

Calculation of photon and current fluctuations in travelling-wave semiconductor laser amplifiers
1991/06 J. Quantum Elelectron.

Cascaded carrier depletion optical switches based on InP/GaInAsP waveguides
1990/09 ECOC'90, paper TuB2.2

Commutation optique: le projet RACE OSCAR
1990/05 Tenth European Symposium on Optoelectronics, OPTO 90

Comparative Study of the Reflectivity of Coated & Angled Facets
1990/03 Integrated Photonics Research Meeting

Comparison of Linear and Reflective 4x4 Ti:LiNbO3 Switch Arrays
1989/03 Topical Meeting on Photonic Switching, paper FE3

Comparison of lithium niobate and indium phosphide optical switch array design and performance
1991 European Fibre Optics Conference/Local Area Networks 1991

Composants en Optique Integree Multifonctions: Modulateurs et detecteurs
1990/05 Tenth European Symposium on Optoelectronics, OPTO 90

Computer Aided Design of Integrated Optical Components
1989/07 IOOC'89, Paper 19D2-1 (Invited).

Computer aided design of integrated optics : closing the synthesis loop
1990/03 Proceedings of Topical Meeting on Integrated Photonics Research

Design Guidelines for laser-diode structures with low reflectivity for both TE and TM modes
1990/03 Integrated Photonics Research Meeting

Design of low-loss curved integrated optical rib-waveguides
1989/09 Europ. Conference on Optical Integrated Systems

Developements recents en optoelectronique integree
1990/05 Conference Annuelle du groupe franáais de spectroscopie Mîssbauer: Les Semiconducteurs

Devices for Photonic Switching
1989/03 Topical Meeting on Photonic Switching, paper WA3

Efficient finite difference propagation algosthum fro polarized waves: application to curved InP waveguides
1991/09 IOOC/ECOC

Electrically and Optically Controlled p-i(MQW)-n verical coupler switch with electro-optic feedback
1990/04 International topical meetings on Photonics Switching, postdeadline paper 14C-6

Electro-Optic Modulators using novel Buried Waveguides in GaInAsP/InP Materials
1988 Electronic Letters Vol. 24 (4)

Experimental study of switching in a p-i (MQW)-n vertical device
1989 IEEE Photonics Technology Letters, vol 1, No 11

Extension of bidirectional Beam propagation method to TM polarisation and application to laser facet reflectivity
1989 Electronics Letters, Vol. 25

Extremely high waveguide/optical amplifier coupling efficiencies measured on passive test structures
1991/01 IEEE Photonics Technology Letters, Vol. 3, No. 1

Extremely low loss InP/GaInAsP rib waveguides
1989 Electronics Letters, Vol. 25

Fabrication of GaAs/AlGaAs GRIN-SCH SQW laserdiode on Silicon by Epitaxial Lift-off
1991 IEEE Phot. Techn. Letters, 3 (2)

Fabrication of long wavelength OEICs using GaAs on InP epitaxial lift-off
1991/04 Third International Conference on InP and Related Materials

Fast Packet Switching in an Optical Time Multiplexed Space Switch (OPTIMUSS)
1991/03 IEE Colloquim on Optical Multiple Access Networks, Digest 611

Fast Synchronous switching in an Optical time Multiplexed Space Switch (OPTIMUSS)
1991/03 IEE Colloquim on Optical Multiple Access Networks, Digest 611

Filter Characteristics of DBR Amplifiers with Index and Gain Coupling
1991 El. Letters 27, Vol. 27, No. 10

First Digital Optical Switch based on InP/GaInAsP Double heterostructure waveguides
1991/04 Electronics Letters, Vol. 27, No. 9

Fundamental limits on the capacity of packet switched optical networks
1991/05 COST 216 Seminar Modelling of Innovate Optical Neyworks

GaAs on InP : a promising material combination
1989 Chemitronics, Vol 4

GaAs on InP based optoelectonic integrated circuits for optical switching networks
1990/04 Nato Workshop

GaAs Single Quantum Well Grin SCH Ridge Lasers grown on InP by MOVPE
1988/08 11th IEEE International Semiconductor Laser Conference

GaAs Single Quantum Well Grin SCH Ridge Lasers grown on InP by MOVPE
1989 Electronics Letters Vol. 25

Guided-wave switching devices
1991 IOOOC/ECOC '91

HBT for optical switch integration
1990/05 Workshop on Compound Semiconductor Devices and ICs

Heterojunction bipolar transitor waveguides on InP
1991 Integrated Photonics Research 1991, Technical Digest Series, (Optical Society of America)

High performance PIN photodiodes on waveguide for coherent communications
1990/09 ECOC'90, paper TuG4.2

High Speed Wavelength selective switch based on two-mode interference
1989/07 IOOC'89, Paper 19D4-4.

Improved stability of Ti:LiNbO3 devices by using ITO electrodes
1989/04 ECIO'89, paper 1141-40.

Influence of the nucleation and annealing conditions on the quality of InP layers on GaAs grown by MOCVD
1990 Journal of Crystal Growth

InGaAsP/InP 4 X 4 optical switch matrix with current injection tuned directional couplers
1991 ECOC/IEEC '91

InP based integrated optics
1990/07 Summer Topical Meetings on Integrated Optoelectronics, invited paper

InP Monolithically Integrated Passive Access Node Switches for Very High Speed Optical Loop
1991/09 ECOC '90

Integrated Optical Device Simulation - an Industrial Perspective
1989/02 Proceedings of Numerical Simulation and Analysis in Guided-Wave Optics and Optoelectronics

Integrated optical switching in III/V compounds
1990/06 Proceedings of 8th annual European fibre optic communications & local area networks, paper 3.4.1

Integrated optics 4x4 switch matrix with digital optical switches
1990 Electron. Lett. Vol 26

Integration of detectors with GaInAsP/InP Carrier depletion optical switches
1990/10 Electronics Letters, Vol. 26, No. 21

Integration of GaAs MESFETs and InP waveguides for optical switching networks
1989/09 ECOC'89, paper ThA19-4

Integration of GaAs MESFETs and lithium niobate optical switches using epitaxial lift off
1990 Electronics Letters, vol 26 (15)

Key Aspects of Device-Fibre Coupling and Packaging
1991/06 COMPOCTEC Course

Lattice mismatched MOVPE growth on InP and GaAs on masked substrates
1990/04 1st International Conference on Epitaxial crystal growth

LiNbO3 switch arrays : status review and prospects
1990/04 International topical meetings on Photonics Switching, invited paper 14A-3

Low stress Pd/Ge-based ohmic contracts for GaAs epitaxial-lift-off
1991/09 21st European Solid State Device Research Conference ESSDERC '91

Metalorganic vapor phase heteroepitaxial growth of (AL) GaAS on InP for device application
1988 Journal of Crystal Growth Vol. 93

Method for the analysis of the propagation characteristics of curved optical rib waveguides
1991/03 IEEE, J. Quantum Electronics, Vol. 27

Metropolitan Area Network with Passive Node Structure and Fast Flip Access Mechanism
1990/11 10th International Conference on Computer Communication

Monolithic integration of an InGaAs/GaAs/AlGaAs strained layer SQW LED and GaAs MESFET using epitaxial
1990 Electronics Letters, vol. 26

Monolithic Integration of GaAs Electronics and InP Waveguides for Long Wavelength Optical Switching
1989/04 ECIO'89, paper 1141-05.

Monolithically integrated InP Photonic Circuits for Optical processing in the Very High Speed Optical Loop
1991/03 OSA Proceedings on Photonic Switching

Monolithically integrated multi/demultiplexer and access waveguides in InGaAsP/InP
1989/04 ECIO'89, paper 1141-37

Multidimensional Photonic Switches
1990/04 International Topical Meetings on Photonics Switching, Invited paper

Multifunctional semiconductor laser amplifiers: optical amplifier, detector, gate switch and transmitter
1990 OSA Proceedings 1st Topical meeting on Integrated Photonics Research

Network Applications of Photonic Switching
1989/09 ECOC '89, paper WeA15-1

New developments in the heteroepitaxial growth of III-V semiconductors
Review paper - Progress in Crystal Growth and Characterisation, Pergamon Press

New developments in the heteroepitaxial growth of III-V semiconductors
1989/06 Third European Workshop on MOVPE, Invited Paper.

New techniques to improve the InP/GaAs quality
1991/06 Proceeding of the Fourth European Workshop on MOVPE

Novel Method for Analysis of Curved Optical rib-waveguides
1989 Electronics Letters, Vol. 25

Novel optoelectronic devices and integrated circuits using epitaxial lift-off
1990/10 SPIE Int. Conf.: Physical concepts of materials for novel optoelectron. device appl.

One step integration of GaInAs monitor photodiode and InP/GaInAsP/InP waveguides
1989/07 IOOC'89, Paper 20B1-18.

Optical Access Switch - First Photonic Switching Demonstrator within the RACE Program
1991 Photonic Switching 1991, Technical Digest Series, Postdeadline Papers

Optical amplifiers used as functional components
1991 Proceedings 2nd Topical Meeting on Optical Amplifiers and Their Applications

Optical Circuits and Integrated Detectors
1991/04 IEE Proceedings-J Optoelectronics, Special Iss on Semiconductor Optoelect., Vol. 138, No. 2

Optical Crossconnect Circuit with Intersecting Waveguides on InP Substrate
1989/04 ECIO'89, paper 1141-16

Optical Facility Switching in Multi-Service Broadband Networks
1990/10 IEE International Conference on Integrated Broadband Services and Networks

Optical Space Switch Architectures based upon lithium niobate crosspoints
1989 British Telecom Technology Journal, Vol 7 No 1

Optical switch arrays in LiNb03, status review and prospects
1989/02 IGWO'89, paper MAA1.

Optical switches and bipolar transistors for monolithic optoelectronic integrated circuits
1990/09 ECOC'90

Optical switches and heterojunction bipolar transistors in InP for monolithic integration
1990 ESSDERC'90

Optical switches on InP substrates using Carrier Depletion with driving voltages as low as 4.5 volt
1989/09 ECOC'89, paper WeA13-3.

Optical Switching in Telecommunications Networks
1989/04 ECIO'89, paper 1141-25

Optical switching technologies for the European RACE programme
1990/03 Proceedings of Topical Meeting on Integrated Photonics Research, paper MA1 (invited)

Optical Time Multiplexed Space Switching
1992 Opto-Electronics Conference - Tokyo (OEC)

Optically Controlled Bistable Switching Element based on Electro-Optic Feedback
1989/03 Topical Meeting on Photonic Switching, postdeadline paper.

Opto-electronic integration of optical switching devices for telecommunications
1990 SPIE proceedings of the Fibre-Optics '90 conference

Passive access to a very high speed optical loop - the VHSOL concept
1990/06 Proceedings of 8th Annual European Fibre Optic Communications & Local Area Networks

Photonic Devices for Optical Switching: from Technology to Systems
1991/04 Invited paper, Proceedings on Indium Phosphide and Related Materials

Photonic switching devices and applications
1989/09 ECOC'89, Paper WeA13-1

Photonic Switching System Experiments in the RACE Program
1990/01 OFC'90

Photonic Switching Systems Experiments in the European RACE Programme
1989/03 Topical Meeting on Photonic Switching

Point-to-multipoint switching networks
1990 Trends in Telecommunications, Vol. 6, 91-100 (No. 2)

Polarisation independent switches in Ti:LiNbO3, critical review of the solutions and their applications
1989/04 ECIO'89, paper 1141-39

Polarisation independent switches on LiNbO3
1990 Proceedings of IPR'90, paper MH7

Polarisation insensitive 1.55 μm S.C. optical amplifier integrated with passive waveguide mode by MOCVD
1991 Proceedings InP and Related Compounds

Polarisation insensitive 1.55 μm semiconductor integrated optical amplifier with access waveguides grown by
1991/05 El. Letters VOL. 27

Polarisation insensitive optical amplifiers: modelling and measurement, in Integrated Photonics Research 1991
1991 Technical Digest Series, (Optical Society of America)

Polarisation Selective Double Antireflection Coatings for Semiconductor Lasers
1990/09 ECOC'90

Progress in the growth of (Ga,In) (As,P) InP heterostructures by chloride vapour phase epitaxy
1991/05 Proceedings of the 3rd European Conference on Crystal Growth (ECGG3)

Quantum calculation of the performance of travelling wave semiconductor laser amplifiers
1990 International Electron. Devices Meeting

Recent developments in lattice mismatched and strained layer heterostructures
1990/11 Invited talk, E-MRS Fall Meeting

Recent Progresses on InP based integrated optics devices
1989/09 Euro. Conf. on Optical Integrated System

Reflectivity Minimization of Semiconductor Laser Amplifiers with Coated and Angled Facets
1991/06 IEEE-J Quantum Electronics, Vol. 27

Reflectivity Optimisation of Semiconductor Lasers with Coated & Angled Facets considering 2-dimensional
1990/09 Twelfth IEEE International Semiconductor Laser Conference

Relaxed Lattice-Mismatched Growth of III-V Semiconductors
1991 Progress in Crystal Growth and Characterization, Pergamon Press, Vol. 22, nr 1-2

Selective MOVPE Growth of GaAs and InP on Si Substrates
1990/05 Proceedings of SOTAPOCS XII

Semi-Vectorial Method of Lines for the Accurate Solution of Optical Rib Waveguides
1990/09 ECOC'90, paper TuB1.2

Semiconductor based switches within the RACE Photonic Switching program
1991/03 OSA Proceedings on Photonic Switching

Semiconductor laser amplifier optimization: an analytical and experimental study
1989/08 IEEE Journal of Quantum Electronics

Single mode polarization insensitive GaInAsP/InP total internal reflection switch
1990/09 ECOC'90, paperTuB2.3

Size, transparency & control in optical space switch fabrics:a 16x16 single chip array in Lithium Niobate
1990/04 International topical meetings on Photonics Switching, paper 13A-3

Stability of Polarization Independent LiNb03 Switches
1989/04 ECIO'89

Switch arrays fro photonic switching: status review and prospects
1990 GLOBECOM '90

Switch Matrix with semiconductor Laser Amplifier Gate Switches: A Performance analysis
1989/03 Topical Meeting on Photonic Switching, paper FE5.

Synchronisation of passive access nodes in a very high speed optical packet networks
1990/09 ECOC'90, paper WeG2.6

Synchronous optical switching in a time multiplexed network
1990/06 Proceedings of 8th Annual European Fibre Optic Communications & Local Area Networks

System Experiments with a packaged 4x4 Polarization Independent Switch Matrix
1989/03 Topical Meeting on Photonic Switching, paper FE2

System performance of semiconductor laser amplifier detector
1989 Electronics Letters, vol. 25

The implementation of waveguides, optical devices & detectors in InP for implementation in optical diversity
1989/09 ECOC'89, Invited paper.

Theoretical and experimental investigations of 1x2 digital switches
1989/09 ECOC'89, paper WeA13-4.

Theoretical and Experimental Study of Carrier Effects and Electroabsorption in Carrier Depletion InP/GaInAsP
1991/09 ECOC/IOOC '91, paper Tu. PS1.24.7z

Theoretical optimisation of electrooptical phase modulation in InGaAsP quantumwells
1989/03 Topical meeting on Quantum Wells

Theoretical optimisation of InGaAsP multiple quantum well waveguide modulators for the 1.55 μm wavelength
1989/09 ECOC'89

Theory and applications of the beam propagation method
1989/02 Workshop on Numerical simulation and analysis in guided-wave optics and optoelectronics

Time and Wavelength Division in a Photonic Switching Network
1989/03 OSA Proceedings on Photonic Switching, vol. 3

Transfer Matrix Model for Evaluation of Optical Switch Structures
1990 Electronics Letters 26

Travelling Wave Semiconductor Laser Amplifiers for Simultaneous Amplification and Detection
1989/03 Topical Meeting on Photonic Switching, paper FD4.

Travelling wave seminconductor laser amplifier detectors
1990 J. Lightwave Technology, vol LT-8

Tree-structured Polarization Independent 4x4 Switch Matrix LiNb03(Lithium Niobate)
1988 Electronics Letters Vol. 24

Very low driving voltage optical switching OEIC combining an InP Optical Switch with a GaAs MESFET
1991/09 ECOC/IOOC '91, PAPER We.C6.4

Very low loss waveguides and efficient modulators in InGaAsP/InP
1989/02 IGWO'89

Very low power non-linear directional coupling in a p-i(MQW)-n vertical coupler using an electo-optic
1990 IEEE Photonics Technology Letters, vol 2

R1034 Usability Engineering Requirements for IBC

ATM adaptation layer protocols and IEEE LAN interconnection
1990/10 15th conference on Local Computer Network

R1035 Customer Premises Network

About Maximum Transfer Rates for Fast Packet Switching
1991/09 ACM SIGCOMM

ATM Adaptation Layer Protocols and IEEE LAN Interconnection
1990/10 15th Conference on Local Computer Network

ATM Adaptation protocol at B-ISDN User Network
1991/09 IBC views from RACE, Elsevier

Bridged LAN interconnection through ATM
1991/06 EFOC/LAN '91

Customer Premises Network Aspects
1991/09 IBC views from RACE, Elsevier

Flexibles Systemkonzept zur Einfuhrung von BK-Diensten im privaten Netzbereich
1990/12 NTZ

Network Evolution Towards IBC-Integrated Broadband Communications
1992/01 IFIP Workshop on Broadband Communications

Signalling protocol at B-ISDN User Network Interface
1991/09 IBC views from RACE, Elsevier

Support of B-ISDN Traffic of non-ATM LANs
1992/01 IFIP Workshop on Broadband Communications

R1036 Wavelength and Time Division Multiplexed Broadband Customer

A broadband CPN demonstrator using wavelength and time division multiplexing
1992/08 Electronics & Communication Engineering Journal

A multi-gigabit/s optical business communications system using wavelength and time division multiplexing
1990/09 ECOC 90

A Si bipolar chip set for 2.5 Gbit/s broadband custromer premises network
1992/05 Custom IC Conference, Boston - USA

A skeleton for the specification of OSI protocols in SDL
1989/10 Fourth SDL forum

Advanced optical components for high bit rate WDM networks
1990/06 EFOC/LAN 90

Diode-coupled high density demultiplexer for multi-wavelength optical systems
1990/11 Conference on High performance electronic packaging

Diode-coupled high density wavelength demultiplexers
1990/05 IEE Colloquium on 'Optical connection and switching networks for communication and computing'

Distributed control for a high-speed optical customer premises network
1990/05 ISS 90

High density wavelength division multiplexing for multiple networks
1991/03 IEE Colloqium on Optical multiple access networks

High speed Pseudo-random binary sequence generation for testing and data scrambling in gigabit optical
1992/04 IEE Colloquium : Gigabit logic circuits

Initial tests on a high density wavelength division multiplexed network
1991/09 ECOC '91

Le multiplexage de longeur d'onde
1992/06 Masson, Paris (publisher)

Multichannel grating demultiplexer (MGD) receivers for high density wavelength multiplexed systems
1989/07 IOOC

Never mind the bitrate - RACE away on fibre
1992/05 Conference : HDTV - Quality or Quantity

Never mind the bitrate - RACE away on fibre (revised)
1992/06 ATM

Optical routeing for TV studio centres - paper study to pilot system
1992/07 International Broadcating Convention

Practical realisation of a high density diode-coupled wavelength demultiplexer
1990/08 IEEE Journal

Progress in the development of a digital optical routing system for television studio centres
1988 IBC'88, IEE Conference Publication Number 293

Routing for the future
1990/11 Television - the Journal of the Royal Television Society

Shumbler : A 155 Mb/s BICMOS Synchronous Multiplexer Chip for a Broadband Customer Premises Network
1991/09 IEEE Journal of Solid-State Circuits

The 152.582 nm mecury line, a cheap and accurate wavelength standard for WDM and OFDM optical fibre
1992/02 IEE Colloquium : Wavelength standards in fibre optic systems

The first year's work for RACE Project 1036, WTDM Broadband Customer Premises Network
1989 BBC Research Department Report 1989/6

R1038 Multimedia Communication, Processing and Representation

Arquitectura de un terminal multimedia con interfaz MTA
1991/11 Telecom I + D Conference

Combining Hypermedia Browsing with Formal Queries
1990 Interact '90 (published in proceedings)

Die Zukunft der Informationstechnik
1991 Funkschau 16 (Interview)

Ein Multimedia Terminal fAr BArokommunikation
1989/10 Dortmunder Fernsehtage

Einbeziehung von Hypermediatechniken in die multimediale Kommunikation
1990/04 Hypertext/Hypermedia 90

El modo de Transferencia Asincrono en la RDSI de Banda Ancha
1991/07 Revista Espanola de Electronica No. 440-441.

El Terminal Multimedia en las Communicaciones de Banda Ancha
1990/06 Eurotelecom

Extending OSI-Protocols supporting multimedia Information Exchange
1991/03 Proceedings Organization of Information Systems

FDDI - ATM MAC bridge
1991/04 Workshop on ATM Network Planning and Evolution

Hypermedia Approaches
1990 Interact '90 (published in proceedings: 1st Int Conference of Int Society for Knowledge

Integration of Telecommunication Services in a Hypermedia System
1992/02 Proceedings of the 15th European Congress Fair for Technical Communications - Online 92, pp

Integration und Bedienung breitbandiger multimedialer Dienste aufzukunftigen Endgeraten
1991/10 Jahrestagung der Gesellschaft fur Informatik GI'91

MCPR - A Multimedia Terminal for Broadband Networks
1990/10 IEE International Conference on Integrated Broadband Services and Networks

MCPR, un Terminal para la Red de Banda Ancha. Integra imagenes vivas, fotos, texto y sonido
1989/12 Sistemas de Informatica y Communicationes, No 8

Methods for Distributed Multimedia Information Systems Based on Private Broadband Networks
1992/04 Proceedings IEEE, Multimedia 92 - Monterey, CA

Modello di riferimento OSI e reti a larga banda
1990/09 Congresso Annuale dell'Associazione Italiana per l'Informatica ed il Calcolo Automatico - Bari

Multimedia Communication and Information Management Based on Available and Emerging
1991/10 Telematics '90 - Proceedings of the Conference held at Bremen

Multimedia Communication, Processing and Representation
1990/04 Hypertext/Hypermedia 90

Multimedia Multiservice Terminal for an ATM based Broadband Network
1991/10 Technical Symposium of the 6th World Telecommunication Forum - Geneva

Multimedia System - Breitband Realisierung
1992 Handbook Multimedia, Paidia Verlag, Fulda

Multimedia Terminals in Broadband Communications
1990/03 Workshop on Software Architecture for Integrated Broadband Communic. Networks, RACE 1017

Neue Anwendung in Neuer Qualitaet
1992 NET - Special - Breitbandvision wird Real, R.v. Dechser's Verlag

Object-Oriented Integration and Conversion of Image Information in Open Multimedia Systems
1992/10 Proceedings EUSUG92 - Wiesbaden - Germany

On the way to Hypermedia and Multimedia Services and Terminals, Interactive Communication Tools
1990/05 Interactive Communication Tools

Realization of a Multimedia System in a Broadband ATM Environment
1992/02 Proceedings of the 15th European Congress Fair for Technical Communications - Online 92, pp

Redes interiores y terminals de abonado. Instalaciones adecuadas para usuarios multimedia
1991/11 Comunicaciones World, Mo. 51

Senalizacion para la RDSI de Banda Ancha
1992/06 Revista Espanola de Electronica

Sistemas Hipermedia Distributiones en Redes de Banda Ancha
1992/10 Revista Espanola de Electronica

Subscriber Premises Network Requirements fro Multimedia Terminals
1991/06 2nd International Conference on Local Communication System: LAN and PBX

Terminals - Service Integration
1992 Book : Integrated Broadband Communication : Views from RACE - Elsevier Science Publ.

R1039 DIMUN - IBC Application Pilot

A testbed for Groupware Applications
1990/09 IFIP WG 8.4 Conference on Multiuser Application & Interfaces

Autonomous User Agents (to be published).
1989 European Workshop on Modelling Autonomous Agents

Broadband Applications in Manufacturing
1990/12 Telematics '90 - Proceedings of the Conference held at Bremen

Distributed Enterprises-Application Interfaces
1989/04 Worshop on Interactions between Applications, Services and the CPN environment (ASCI), RACE

Distributed Form Management
1990 ACM Transactions on Information Systems

Distributed International Manufacturing Using Existing and Developing Public Networks
1990/10 Telematics '90 - Proceedings of the Conference held at Bremen

Distributed Manufacturing - User Viewpoints and Requirements
1990/12 Telematics '90 - Proceedings of the Conference held at Bremen

EDI - An Electronic Market Place, New Possibilities
1990/03 CIM Seminar

Enterprises & Distributed CIM: Inter-organizational Communication
1990/06 Proceedings of Conference CIM 90: Integrated Aspects

Experiences on Semi-Autonomous User Agents
1990 Decentralized Artificial Intelligence, Elsevier Science Publishers

High Speed Communication and Multi Media
1990/05 Multi Media seminar

IB - An Information Bus: A multilayered Information Base Interface for Remote Applications
1989/05 Proceedings of Conference on Advanced Systems Engineering

Integrated Communication in CIM
1989/11 Journal of Computer Integrated Manufacturing Systems (to appear)

International Broader Band Services - What can the Corporate Customer Expect From the Future ?
1990/12 Telematics '90 - Proceedings of the Conference held at Bremen

Multiagent hypermedia systems in CIM
1990/01 Hawaii International Conference on System Sciences, Software Issues in CIM

Multimedia Communications
1990/04 MacUser

Multimedia Communications in DIMUN
1990/10 Telematics '90 - Proceedings of the Conference held at Bremen

Multimedia Communications in DIMUN
1991/05 Proceedings of Teleconference Europe '91

Networked Cooperative Work : Usability Issues of MILAN (Multimedia Industrial Local Area Network)
1990/12 Telematics '90 - Proceedings of the Conference held at Bremen

Object-Oriented Programming in Production Management - Two Pilot Systems
1988 International Journal of Production Research, Vol. 26, No. 5

PAGES - A Tool for Computer Supported Collaborative Work
1990/12 Telematics '90 - Proceedings of the Conference held at Bremen

Semi-automated User Agents in Distributed Change Management
1990 Journal of Intelligent Manufacturing

Specification of the pilot installation at EB national Transformer in the DIMUN project
1990/06 SI report nr 90 01

Standard Interfaces - A way to Unify Company Communication
1990/12 Telematics '90 - Proceedings of the Conference held at Bremen

The computer won't let me: Cooperation, Conflict and the Ownership of Information
1991/10 DTI CSCW Special Interest Group

The DIMUN Project-Experimences with Multimedia Communications in One-of-a-kind Manufacturing
1991/11 Proceedings of IFIP TC5/WG.5.7

Using Existing and Developing Public Networks
1991/05 Proceedings of Teleconference Europe '91

Windows and Rooms: Two Metaphors for Groupware
1991/11 COCS '91, Conference on Organizational Computing System

R1040 RACE Integrity Primitives Evaluation

A European call for integrity primitives: RIPE-Race Integrity Primitives Evaluation
1989 Proceedings of Eurocrypt '89, Springer Verlag

RACE Integrity Primitives Evaluation (RIPE): a status report
1991 Eurocrypt'91, Springer-Verlag.

RIPE: Ein Europaischer 'Call for Integrity Primitives'
1989 Datenschutz und Datensicherung, 9/89

R1041 Functional Specifications of Codecs

Evolving Techniques for Broadcast TV Systems
1990/07 Br. Telecom Technol. J Vol 8 No 3

FUNCODE: Subjective Quality Evaluation in Still Image Coding
1991/04 ISSLS 91

Human Factors in system design. Subjective image quality assessment & prediction in digital
1990/06 Seminar in HF in information services

Subjective Image quality aspects in videocommunication systems
1990/09 13th International Symposium HFT'90

R1042 Functional Service Integration in Support of Professional User

Multi-Media Approach to Image Communication (RACE MultiMed)
1989/06 6th Scandinavian Conference on Image Analysis

R1043 Mobile Telecommunications Projects

1.7GHz propagation measurements for highway microcells
1990/08 Electronics Letter, vol 26, No 16

1700 MHz Urban Microcells and their coverage into buildings
1990/04 IEE ICAP Conference

Adaptive bit rate transmission for personal telecommunications
1990/06 Proceedings of the 4th Nordic Seminar on DMR 4

Adaptive resource allocation in metropolitan area cellular mobile radio systems
1990 VTC '90

Broadband on the move
1990/10 International Conference on Integrated Broadband Services & Networks, IEE

Channel sound measurements at 60 GHz using wideband techniques with particular reference to microcellular
1989/12 5th International Conference on Mobile & Personal Communications

Charging aspects of personal Communications
1989/11 Cellular and Mobile Communications Conference

European personal Communications using Microcells
1989/02 IEE Colloquium on Microcellular Radio

Flexible System Techniques for future Personal Mobile Communications
1990/09 IEEE TENCON '90 Conference

Future Pan-European Land Mobile Radio System - Architecture and Performance Issues
1990/02 IFIP TC7 Conference Performance Evaluation of Computers & Computer Networks

Handover Initiation and control for Highway Microcells
1990/06 DMR Conference

Handover strategies in microcellular based personal telephone systems
1990/04 Conference RVK '90

Handover strategies in microcellular based personal telephone systems
1990/04 Proceedings RVK-90

Handover Techniques for a Third-Generation Mobile System
1991/11 Mobile Radio Conference 1991 - Nice

High bit rate transmission techniques
1992/05 VTC 92 - Denver

LLMTS Personal and Mobile Communications Service
1989/10 ITU Com 89

Microcellular mobile radio systems
1990/01 British Telecom Technology Journal

Modulation techniques for mobile radio
1992/05 VTC 92 - Denver

Multipath Time Delay Measurements in Public Man Made environments
1990/06 DMR IV Conference

Network aspects of UMTS
1991 IEEE GLOBECOM 91 - Phoenix, USA

Network aspects of UMTS
1992/06 IEEE Int. Conference on Selected Topics in Wireless Communication - Vancouver, Canada

Network aspects of UMTS
1992/10 IEEE Int. Symposium on Personal, Indoor and Mobile Communications - Boston

Overall concept of UMTS
1992/04 WINLAB Workshop at Rutgers University, New Jersey, USQ

Overall concept of UMTS
1992/05 IEEE Vehicular Technology Conference (VTC) - Denver, USA

Potential of CDMA for Third Generation Mobile Radio Systems
1991/11 Mobile Radio Conference 1991 - Nice

Reduced-state Viterbi equalisation
1991/11 Mobile Radio Conference 1991 - Nice

Technical programme of the RACE Mobile Telecommunications Workshop
1992/05 Proceedings of RACE Mobile Telecommunications Workshop

R1044 IBCN Development of the Functional Reference Model

A Framework for Studying the Impact of Broadband Services on Telecommunications Networks
1991/06 ITC - Copenhagen

A Functional Framework for IBC Services
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

A functional model for the Intelligent Network Concept
1990/10 IBSN - London

A Study of the Provision of Broadband Services to Business Subscribers
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

A Techno-economic Evaluation of Introduction Strategies of New Media in the Private Subscriber Network
1991/06 ITC - Copenhagen

Access Network Evolution to serve broadband business subscribers
1990/10 IBSN - London

Addressing - On the User Terms ?
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Addressing Specification : A Systems Approach
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Alcatel Involvement in RACE
1990 Electrical Communication (a joint R1022-R1044 paper) Vol. 64 N 2/3, 1990

Alternative Layouts of Optical Access Networks
1993/03 8th European Network Planning Workshop

An Approach to the Design of B-ISDN Protocol Reference Model
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

An Approach to the Design of the B-ISDN Protocol Reference Model
1991 Contribution to the R1044 Book An Approach to the Design of the B-ISDN Protocol Refernce Model

Arising from Marketing the Widespread Use of Multimedia Services and UPT : The Consequences for Network
1990/11 12th IDATE Conference - Montpellier

ATM Adaptation Layer Protocol and IEEE LAN Interconnection
1990/10 IEEE 15th Conference on Local Nets - Minneapolis

ATM Adaptation Layer Protocol at B-ISDN User-Network
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

ATM : bandwidth assigment and enforcement policies
1989/11 Globecom '90 - Dallas

ATM Implementation for Large Scale Utilizations : what is needed in '92 to start in '95?
1991/06 ICC '91 - Denver (USA)

ATM : Trying to answer the planner's basic questions
1991/04 ATM Workshop - London

B-ISDN Economic Evaluation in Metropolitan Areas
1992 JSAC Special Issue on B-ISDN Application Economics

B-ISDN Signalling Principles
1991/04 IX ISSLS - Amsterdam

Basic concept about services and service description
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Bridged LAN Interconnection through ATM
1991 EFOC LAN '91 - London

Broadband Networks : the major European Industries aim at common strategies and earley applications in
1988/11 10th IDATE Congress Montpellier

Comparison of Broadband Access Network with Alternative Topologies
1993/09 ISSLS - Vancouver

Control Plane Reference Configurations
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Description of a multimedia Conference service
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Design of a DCC Operated Transmission Network with Flexibility Constraints
1991/03 7th European Network Planning Workshop - Les Arcs

Economic aspects of optical coherent transmission in the access network
1991/01 OCTIMA '91- Rome

Efficient Use of Protocol Stacks for MAN/LAN-ATM Interworking
1992 JSAC Special Issue on B-ISDN Application Economics

Engineering IBC Services
1992/01 IBC : Views from RACE : Usage Aspects - North Holland (R1077 Publication)

Evolution Opportunities towards B-ISDN '95
1990 7th Seminar - Morristown

Evolution to the B-ISDN : Overview and Preliminary Guidelines
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Evolutionary Strategies of flexible transmission networks
1990/10 IBSN - London

Examples of Application of Reference Configurations Interworking
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Experience of Functional Modelling
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Exploring next decade frontier : pulls, pushes and bottle-necks
1989/11 Networks '89 - Palma (Spain)

Extrapolating ATM Simulation Results using Extreme Value Theory
1991/06 ITC - Copenhagen

Fibre-to-the-home : Techno-economic evaluation within Europe by the RACE program
1991/04 IX ISSLS - Amsterdam

Forecasting the Demand for B-ISDN Using a Sectoral Inference Rule
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Forecasting the Demand of New Telecommunication Services
1991/12 GLOBECOM 91 - Phoenix

Gauging the Impact of Broadband on a European Scale : EUROPIA as a Methodological Tool
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Generalized Karlsson Measurements for ATM Networks
1991/04 ITC Specialist Seminar - Crakow

Generic IBC call handling Functions
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Guidelines for planning the ATM Application in Metropolitan Areas
1992/05 5th International Network Planning Symposium - Kobe, Japan, '92

IBC Servuces Functionalities
1990/10 IBSN - London

IBC System Engineering
1991/12 GLOBECOM 91 - Phoenix

IBCN introductory steps : overlay networks and physical integration
1990/10 IBSN - London

Identification, Evaluation and Selection of Evolution Prospects towards IBC : General Scenario Concepts and
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Integrated Broadband Communications: views from RACE
1991/09 North Holland Studies in Telecommunication (Volume 16)

Introduction and evolution of Optical Access Networks for Business and Residential applications
1992/08 LEOS Meeting on Optical Multiple Access Networks - Santa Barbara

Introduction Scenarios for Optical Fibre in the Local Loop
1990 ITS Conference - Venice '90

Investments in Telecom - costs and benefits in non core EEC countries, with Denmark as an example
1990 ITS Conference

Key issues in the standardisation of a B-UNI
1990/10 IBSN

MAN : Principles, Architectures and Evolution
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Meta-Signalling
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Methods and Conceptual Tools for Identifying, and Evaluating and Selecting Network Evolution Prospects
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Modelling the Evolution of ATM Networks for Economical Analysis of Metropolitan Networks
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Models for Identifying and Evaluating System Prospects towards IBC
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Network Configuration Options towards the IBCN
1990/11 12th IDATE Congress

Network Management Reference Configurations
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Object-Oriented information modelling in R1044-CSF
1992/01 The Third Telecommunications Information Networking Architecture Workshop - Narita, Japan

Operations and Maintenance
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Optical Coherent Systems role in IBCNs
1989/01 OCTIMA

Optical Wavelength Allocation in the Access Link
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Optimization of ATM Multi-Service
1991/04 ITC Specialists Seminar

Options for Distributive Services in Optical CAN
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Physical Medium Dependent Layer Issues
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Pour une nouvelle approche de l'evaluation strategique
1990/11 12th IDATE Conference -Montpellier

Principles of Functional Modelling
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Quality of Service in Broadband Communications
1990/10 IBSN

Reference Configuration Concepts and Construction Rules
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Role of Ergodic Approximations and of Ergodic Samples in IBC Strategical Planning : Lessons from Pots Traffic
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Scenario Methodologies for Strategic Research on Broadband Communications Networks
1991/06 ITC - Copenhagen

Signalling Protocol at B-ISDN User Network Interface
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Status of Wavelength allocation - Standardization in Race
1992/02 IEE Colloqium on 'Wavelength Standards in Fibre Optic Systems' - London

Stored Program Controlled Telecom Services
1990/04 ICC 90

Strategic Evolution of ATM Networks for Economical Analysis of Metropolitan Networks
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Strategic Network Planning for ATM : a study case
1992 13th ITC

Studies on Systems for new video services within the RACE program
1989/10 131st SMPTE Technical Conference - Los Angeles

Technical Aspects of IBC Service Provision
1992/01 IBC : Views from RACE : Usage Aspects - North Holland (R1077 Publication)

Techno-economic analysis of advanced technology access networks
1991/01 OCTIMA '91

Techno-economic considerations for fibre-to-the-home
1991/06 17th International TV Symposium - Montreux

Techno-Economic Evaluation of Introducing Fibre in the Local Loop
1991 EFOC LAN '91 - London

Techno-economical Analysis of ATM Application in Metropolitan Areas
1992/05 5th International Network Planning Symposium - Kobe, Japan, '92

Telecommunication from the usage point of view
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Telematics and the production structure. The case of small countries in the EEC with Denmark as an example.
1990/08 ITS Conference

Telematik og produktionstruktur
1989/06 Nordata

The B-UNI
1989/02 Swedish Telecom Journal, Issue No. 2

The IBCN : a service independent broadband network
1990/06 INFOCOM 90

The RACE Project R1044 : "IBC Development and Implementation Strategies"
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

The usage Network Interface Project in RACE
1990/10 IBSN - London

The User Network Interface
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Traffic Control for Stepwise VBR Connections in an ATM Network
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Transmission Convergence Sublayer
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

Uni and Bi-Directional 4(lambda) x 560 Mbit/s WDM Laboratory Transmission Systems Using WDM Devices
1990/08 Selected Areas in Communications Vol. 8, No.6

User Plane Reference Configuration
1991 Integrated Broadband Communications : View from RACE : Network and Engineering Aspects

R1046 SPECS - Specification and Programming Environment for

A compilation of algebraic processes based on Extended-Action Derivation
1990 Proceedings of FORTE 90

A Compilation of Algrebaic Process Based on Extended-Action Derivation
1991/11 Third International Conference on Formal Description Techniques

A design-driven approach to software development based on the transformation of algebraic data types
ACM Transactions on Software Engineering & Methodology (TOSEM)

A Formal Techniques Environment for Telecommunications Software
1989 SETSS 89, IEEE Conference Publication 306

A Framework for Test Selection
1991/06 Protocol Specifications, Testing and Verification XI.6

A Process Specification Formalism based on static COLD
1989/04 Prog. Report P 8906, University of Amsterdam, CWI Report CS-R 8930

Algebra and Communicating Processes
1989/05 CWI (RNL subcontractor), Proceedings AMAST Conference Iowa City

An Algebra for Process Creation
1989/04 CWI (RNL subcontractor), to be published in a book in honor of Professor J.W. de Bakker, and as a

An efficient algorithm for branching bisimulation and stuttering equivalence
1990 CWI Report CS-R9001, CWI 1990. Appeared in Proceedings 17th ICALP, WARWICK, Springer

An Operation Semantic Model for Bsic SDL
1991/09 Proceedings from 5th SDL Forum. SDL '91, Evolving Methods

Compiling LOTOS Behaviour Expressions
1990 FORTE 90

Computing distinguishing formulas for branching bisimulation
1991 Proceedings of 3rd CAV, Aalborg '91, Report IR-91-4/5

Design of a specification language by abstract syntax engineering
1989 Proceedings METEOR workshop Methods based on Formal Specifications, MIERLO, Springer

Executing LOTOS Behaviour Expressions
1991/04 Research Report RZ 2118 (* 73402), IBM Research Division

Formal Specification of Telecom Systems in LOTOS
1990 ELIN, XIII International Switching Symposium (ISS '90).

L'environnement de developpement pour logiciel de telecommunication du project SPECS
1991/12 Publication Scientifiques et Techniques d'IBM France

LOEWE: A LOTOS Engineering Workbench
1991/06 Research Report RZ 2143 (* 74743), IBM Research Division

Making Languages more powerful by removing limitations
ACM International Workshop on Formal Methods in Software Development

Mixing LOTOS and SDL Speicifications
1991/11 4th International Conference on Formal Description Techniques, FORTE '91

OST - an Object oriented SDL Tool
1989/06 EB, 4th SDL Forum

Process algebra with guards (combining Hoare logic with process algebra)
1991 Extended Abstract in Proceedings CONCUR '91, Springer LNCS 527

Process Topology Diagrams for LOTOS
1990 FORTE 90

Real time process algebra
1990 Progress report P8916, UvA. Revised version P 89166, University of Amsterdam, 1990. Extend.

Real time process algebra
1991 Formal Aspects of Computing 3 (2)

SARL - un Système d'Aide à la Reutilisation du Logiciel
1989/12 2nd International workshop on Software Engineering and its Application

SDL - On-Line Help
1989/10 INESC, SDL'89: The Language at Work

Specification and verification of real time systems in ACP
1990 Proceedings 10th Int IFIP WG 6.1 Symposium on Protocol Specification, Testing & Verification

Sprachunterstutzung zur Wiederverwendbarkeit
1989/11 PKI,ITG/GI/GMA Fachtagung:Softwaretecknik in Autom. und Kommunik.-Wiederverwendbarkeit

Stepwise Production of an SDL Description
1990/11 Third International Conference on Formal Description Techniques

Structured design of a translation from LOTOS to MR
1990 Formal Aspects of Computing, Ed C B Jones, The British Computer Society & Springer Verlag

Structured operational semantics and bisimulation as a congruence
1989 Proceedings ICALP 89, Springer LNCS 327. To appear in Information & Control.

The SPECS SDL tower tools
1989/10 SDL '89 - The Language at Work

Transition system specifications with negative premises
1990 Extended abstract in proceedings CONCUR 90, Amsterdam, Springer LNCS 452, 1990.

Translation from SDL to CRL in SPECS
1991/09 SDL '91, Evolving Methods

Tutorial on Object-Oriented SDL

u-CRL: a base fro analysing process with data
1991/06 Proceedings from 3rd Workshop on Concurrency and Compositionality, Goslar (E. Best & R.

Yet another FDT
1989/12 PKI, FORTE Conference

R1049 ATM Concept

802.6 and ATM - Differences and Commonalities
1990/11 4th IEEE workshop on MANs

Asynchronous Switching for Broadband networks
1989 PRT Review

Switching ATM in a Broadband ISDN
1989/06 Networks 89, Birmingham NEC

The Application of SDL to ISDN and OSI
1989/06 7th Int Conference on Software Engineering for Telecommunication Switching Systems

R1050 IBC Applications Analysis

Research in Strategic Technology Markets : the RACE Programme
1988/09 ITMAR '88 conference

Research in Strategic Technology Markets : the RACE Programme
1989/05 UK Industrial market Research Society's 1989 Annual Conference

R1051 Multi-Gigabit Transmission in the IBC Subscriber Loop

20 Gbit/s Optical Pattern Generation Amplification and 115 km Fibre Propagation Using Optical Time Division
1990 Proceedings ECOC '90

Analogue TV Distribution System and Digital Feeder up to 20 Gbit/s
1990 Alcatel Technology Review

Customer Access Connections projects in RACE : an Evolutionary Approach to Fibre to the Home
1990 ICC/SUPERCOM 90

Distribution of Digital HDTV over Fibre
1991 Proceedings International TV Symposium, Cable TV Session

Entwicklungslinien optischer Weitverkehrssysteme und Komponenten/Evolution of Optical Long Haul Systems
1990 Proceedings Conf. Muenchener Kreis Glasfaser bis ins Haus/Fibre to the Home

High Bit Rate Experiments, Emerging Ligthwave Technology
1991 Eastern Communication Forum ECF 91

Optische Ubertragungssysteme hoher Bitrate/Optical Transmission Systems at High Bit Rate
1991/02 VDE

Simultaneous Distribution at 1550 nm of Analogue AM-TV and Multigigabit HDTV with Optical Amplifiers
1991 Proceedings Second Topical Meeting on Optical Amplifiers and their Applications

The role of very high speed optical transmission and time-division multiplexing in future IBCN
RACE Summer School on Optical Communication

Very high speed optical transmission systems
1990 International Telecom symposium

R1052 Signal Processing for Optical and Cordless Transmission

10 Gbit/s timing recovery circuit using dielectric resonator and active bandpass filters
1992 Electron. Lett. 92-98

10 GBit/s to 260000 subscribers using optical amplifier distribution network
1992 ICC Super-comm. 1992 - Chicago

A 10 GHz Bandwidth Low Noise Optical Receiver using Commercial Components
1990/01 IEEE Electronics Letters

Broadband transmission techniques for the local loop
1992 EFOC/LAN Conference - Paris 1992

Combined Line Coding and Modulo Arithmetic Detection Techniques for Digital Fibre Optic Communications
1988/10 Proceedings of the International Conference on Data Communications Technology

Modelling and Simulation of Digital Transmission Systems: Design of Optimally Tolerant Equalizers
1991/07 13th IMACS World Congress on Computation and Applied Mathematics

Self-Equalisation Codes and Optimally Tolerant Equaliziers for Digital Channels
1991/05 3rd Bangor Communications Symposium

R1053 TMN Evolution of Reference Configurations for RACE

A European Survey of Public Network Management Systems
1990/01 IEE Colloquium on Network Management & Signalling

The concept of Gradual Automation of Management Services (GAMS)
1991/11 5th RACE TMN Conference

The impact of the evolving European regulatory scenario on the TMN Reference Configuration design
1990/11 4th RACE TMN Conference

The management Services applied to case studies of Real Networks
1991/11 5th RACE TMN Conference

The TMN Reference Configuration Design under Object-Oriented Paradigm
1991/11 4th Race TMN Conference

TMN applied to IN
1990/06 TINA 90 (Telecommunication Information Network Architecture) Conference

TMN Architectural Requirements for the Service Provisioning in flexible, multi-service SDH Networks
1991/03 ENPW'9, Proceedings. 7th European Network Planning Workshop

TMN Design process update
1991/11 5th RACE TMN Conference

TMN Reference Configurations Design by the RACE Project R1053 TERRACE : first results and further Efforts
1989/08 3rd RACE TMN Workshop

R1054 APPSN - Application Pilot for People with Special Needs

A description of two RACE projects, APPSN and TUDOR for PSN
1990/06 Telematics '90 - Proceedings of the Conference held at Bremen

A Service Pilot for Deaf Persons through Videotelephony
1991/03 6th Annual International Conference on Technology and Persons with Disabilities

Beeldtelefonie voor Slechthorenden
1990/10 Tijdschrift van het Nederlands Elektronica en Radiogenootschap

Bildkommunikation for personer met handikapp (Picture Communication for the Disabled People)
1989/12 Report from the Swedish Handicap Institute Number 89322

Elderly Persons and Communications
1991/08 1st International Conference on Technology and Ageing

Evaluation of a videotelephony support service for people with special needs
1990/09 Proceedings of the 13th International Symposium on HFT 90

Experimente und messungen zur Nutzung des Bildtelefones
1990/03 (CSELT) conference Benutzerfreundliche Kommunikation

High bit ratio Video Communication for Deaf People
1990/11 ECART-Conference

Improved Speech Reception through Videotelephony: Experiments with the Hard of Hearing
1991/05 IEEE J. on Selected Areas in Communicat., Vol. 9, No. 4-Special issue on Human Interfaces in

Including Customer Requirements in the Design and Development of Telecommunications Services
1990/09 Proceedings of the 13th International Symposium on Human Factors in Telecommunication. HFT'90

Picture Communication
1991/10 6th World Telecommunications Exhibition and Forum

Picture telephones and warming systems - examples of new telematics facilities for the benefit of deaf persons
1991/07 Proceedings at the XI World Conference of the World Federation of the Deaf

Pilot Applications for Advanced Communication Technology in Care for the Elderly in Europe
1991/08 21st International Conference on Technology and Aging

RACE Projects: APPSN and TUDOR
1990/06 Telematics '90 - Proceedings of the Conference held at Bremen

Requirements for Video-telephony terminals for support services for people with special needs
1990 Proceedings of the 13th International Symposium on HFT 90

Safety and service through Videotelephony
1991/07 Proceedings of the XI World Congress of the World Federation of the Deaf

Serviço videotelefônico complento de aproio domicilario - Estudio exploratòrio
1991/10 II Semana Idade de Ouro, Camara Municipal de Cascais - Cascais

Sjalvstandighet och trygghet genom telekommunikation (Independency & Safety through telecommunications)
1991/05 Nordic Conference on Telecommunications and Disability - Social Aspects.

Support for Elderly People using Videotelephony: The Frankfurt Pilot
1991/08 1st International Conference on Technology and Ageing

Support Service at a Distance for Elderly People - an Exploratory Study
1991/06 EDUCACAO especial e Reabilitacao, Vol. 2, No. 5

Telecommunication devices for deaf people: We must Influence the Development
1990/07 WFD News No. 2

TeleCommunication for People with Special Needs
1992/11 Lisbon COST Conference

Telecommunication requirements and facilities for the hearing-impaired
PTT/RNL and the Laboratory for Experimental Audiology of the University Hospital in Utrecht

Telecommunication - The Technology of the Future is already here
1990/07 WFD News No. 2

The Italian Pilot
1991/03 6th CSUN International Conference - Los Angeles

The situation in Sweden with regard to picture communication
1991/02 Seminar at the Nederland PTT

Trygghetslarm och service genom videotelefon for aldre personer (Safety & Service through videotelephone for
1990/10 Proceedings of the Nordic Conference on Alarm Systems & Disability

Turvajarjestelmat vanhusten avuksi (Security systems to help eldery people)
1991/01 Tekniikan Nakoalat (Technology Perspectives)

Turvakuvapuhelin - uusi turva- ja palvelujarjestelma vanhuksille ja vammaisille (Safety Videophone - a new
1991/08 National Exhibition and Conference on Disability and Technical Aids

Use of Videophones for Intervention and Independent Living
1991 S. von TETZCHNER (Editor). Issues in Telecommunication and Disabilities, CEC Brussels.

Video Communication for Deaf People in their Working Lives
1989/12 Report I, Pilot Study, Report from the Swedish Handicap Institute

Video communication for deaf people in their working lives
1991 Cost 219 final report

Videophone-based Support Service System for Elderly and Disabled People
1991/07 Proceedings International Conference on Medical Physics

Videotelephony and Speech Reading: The effect of Picture Quality
1991 Issues in Telecommunication and Disabilities, CEC Publication, In: S. von Tetzchner (Editor)

Videotelephony services for visually impaired people
1990 Educacao Especial e Reabilitacao, CDI

Vidoetelephony-based support services for people with special needs
1992 Ergonomics Society's Annual Conference - Birmingham

R1055 MERCHANT - Methods in Electronic Retail Cash Handling using

La CEE choisit SLIGOS pour le projet MERCHANT
1989/03 Informatique Hebdo

La CEE confie à SLIGOS la mise en oeuvre du projet MERCHANT
1989/02 Electronique Actualite

Le Reseau de Paiement Electronique EuropÇen de 1993
1989/02 Logiciel et Services

Les Ambitions sans precedent de RACE
1989/05 Telecommunications Magazine

Merchant: des services New Look pour le paiement electronique
1989/02 Finance Electronique

Merchant ou la tentation de la large bande
1989/11 11th International Conference Communication Services: toward Internationalisation of exchanges

Merchant ou la tentation Large Bande
1989/05 Telecommunications International

Programme Europeen RACE. SLIGOS Maitre d'Oeuvre de MERCHANT
1989/02 Zero Un Informatique

Programme RACE: Qui travaille sur quels projets?
1989/05 Telecoms Magazine

SLIGOS et MERCHANT
1989/02 Ordinateurs

SLIGOS Maitre d'Oeuvre d'un projet RACE
1989/02 L'Usine Nouvelle

SLIGOS Maitre d'Oeuvre d'un projet RACE
1989/02 Lettre de l'Industrie Informatiqe

SLIGOS Maitre d'Oeuvre d'un projet RACE
1989/02 Monde Informatique

SLIGOS maitre d'Oeuvre de MERCHANT
1989 La Lettre - Banque et Informatique

SLIGOS pilotera le projet EuropÇen MERCHANT
1989/02 Agence Economique et Financiäre

SLIGOS pilotera un projet de la CEE
1989/02 Ordinateurs et Banque

SLIGOS Retenue par la CEE
1989/02 L'Usine Nouvelle

SLIGOS Retenue par la CEE
1989/02 Le Monde Informatique

R1056 BIPED

Network Performance (NP) and its relationship with Quality of Service (QoS) in an experimental Broadband
1992/01 Workshop on Broadband Communications, Estoril

Performance Evaluation of Broadband Connections and Services under Varying Traffic Loads
1992/08 IEE Electronics & Communications Journal

R1057 Advanced Quantum Well Lasers for Multi-Gigabit Transmission Syst.

10 Gbit/s MQW-DFB-SIBH Lasers Entirely Grown by MOVPE
1991 Ruprik Publications, Electronics Letters 27, 863 (1991)

Absorption and electroabsorption spectra of InGaAs/InAlAs quantum wells and superlattices
1990 Proceedings Intern. Conference on Modulation Spectroscopy, SPIE Symposium 1286

Characterisation of InGaAs/InGaAsP broad area quantum wells lasers
1990/03 Proceedings of International Conference on Modulation Spectroscopy

Design and performance characteristics of single and multiple phase shifted DFB lasers
1990/09 16th European Conference on Optical Communication, Paper TuF1.4

Direct Comparison of Atmospheric Pressure and Low Pressure MOVPE
1989/06 4th European Workshop on Metalorganic Vapour Phase Epitaxy

Electroabsorption studies on InGaAs/InGaAsP quantum-well laser structures
1991 Appl. Phys. Journal 69, 7703 (1991)

Electroabsorption study of lattice mismatch in InGaAsP/InP heterostructures
1990 Proceedings Intern. Conference on Modulation Spectroscopy, SPIE symposium No 1286

First DFB GRIN-SCH GaInAs-AlGaInAs 1.55 Em MBE MQW active layer buried ridge structure lasers
1991/01 Electronic Letters, Vol 27

Generation of 170 GHz optical sidebands of a single-mode semiconductor laser by nonlinear intracavity
1991 Appl. Phys. Lett. 58, 554 (1991)

Generation of 170 GHz optical sidebands of a single-mode semiconductor laser by nonlinear intracavity
1990 Proceedings of 12th International IEEE Semiconductor Laser Conference

Grating formation by chemical etching in InAlAs for MQW devices
1989 Electronic Letters 25 (1989) 725

Growth and assessment of InGaAs/InGaAlAs/InP mutliple quantum well lasers
1990/03 IC-MOVPE 5

Growth of GaInAs by Chemical Beam Epitaxy
1990/06 J. Crystal Growth

High performances DFB-MQW lasers at 1.5 Em grown by GSMBE
1990 Electronics Letters Vol. 26

High speed and coherent transmission components
1990 European Transactions on Telecommunications, vol I

High speed lasers with semi-insulating blocking layers
1989 European Laser-Workshop

High static performance GaInAs-GaInAsP SCH MQW 1.5 Em wavelength buried ridge stripe lasers
1991/06 IEEE Journal of Quant. Elec., vol 27

Influence of the p type doping of the InP cladding layer on the threshold current density in 1.5 Em QW lasers
1990/09 12th IEEE International Semiconductor Laser Conference

InGaAsP/InP lasers with semi-insulating current blocking layers for ultra high speed applications
1990 Proceedings 2nd International Conference on InP and related materials

InGaAsP/InP-Laser fuer sehr hohe uebertragungsgeschwindigkeiten
1990/04 Proceedings of ITG/GME Factagung Heterostruktur-Baulemente

InP-based quantum well material for lasers and modulators
1991/06 9th Annual European Fibre Optic Communications and Local Area Network Conference

Klein-und Gro-signal-HF-Simulation von InGaAsP/InP-Lasern
1990/04 Proceedings of ITG/GME Fachtagung Heterostruktur-Bauelemente

Lasers for coherent systems
1989/09 Proceedings of the Fourth Tirrenia International Workshop on Dig. Communications.

Linewidth enhancement factor and carrier-induced differential index in InGaAs separate confinement
1991/08 Appl. Phys. Journal 70 (4)

Logarithmic gain/current density characteristic of InGaAs/InGaAlAS/InP Multiquantum-well
1991/02 Electronics Letters, Vol 27

Long wavelength InGaAsP/InGaAs and InGaAlAs/InGaAs MQW SCH lasers
1990/06 IEE Colloquium on Applications of quantum well in optoelectronics

Long wavelength quantum well lasers: Synopsis of the RACE AQUA Project
1991 Proceedings of 3rd International InP Conference

Low threshold 1.5 m SCH-MQW lasers by atmospheric pressure MOCVD and direct comparison of low
1991/01 Journal of Crystal Growth, Vol 107

Low threshold 1.55 μm SCH-MQW lasers by atmospheric pressure MOVPE
1990/06 Presentation at Electronic Materials Conference

Low threshold 1.55 μm SCH-MQW lasers by atmospheric pressure MOCVD and direct comparison of flow
1991/01 Journal of Crystal Growth, Vol. 107

Low threshold GRIN-SCH AlGaInAs 1.55m Quantum Well Buiried Ridge Structure Laser Grown by Molecular
1990/06 Electronic Letters

MBE growth of GaInAs/InP structures quantum wells and selective epitaxy
1989 ESSDERC SETT '89

MBE growth of graded index AlGaInAs MQW lasers on InP
1990/08 MBE VI International Conference

MBE growth of InGaAlAs on InP for Light Emission Devices
1990/06 EMC

MOVPE of In(GaAs)P/InGaAs MQW structures
1990/06 Presentation at ICMOVPE V

MOVPE of In(GaAs)P/InGaAs MQW structures
1991 Journal of Crystal Growth 107, 561 (1991)

Multiquantum well la: rs emitting at 1.55 Em by GSMBE
ECOC 89

Optical study of the elctronic states of InGaAs/InAlAs quantum wells in high electric fields
1991 Physical Review B 43, 2263 (1991)

Optimisation and comparison on InP-based quantum well lasers incorporating InGaAlAs or InGaAsP alloys
1990 International Symposium on GaAs and Related Compounds

Optoelectronic devices by GSMBE
1989 Presentation at ICCBE 2 (invited)

Some new results on non radiatie recombination in MBE grown GAs-GaAlAs heterostructues
1990 Inst. Phys. Conf. Ser., 106

Some new results on non radiative recombination in MBE grown GaAs-GaAlAs heterostructures
1989/09 Presentation at International Symposium GaAs and rel. comp.

Technologien fuer Multi-Quantum-Well-Laser
1990/04 Proceedings of ITG/GME Fachtagung Heterostruktur-Bauelemente

The static and dynamic characteristics of single and multiple phase jump DFB laser structures
1990/09 Paper H-2, 12th IEEE International Semiconductor Laser Conference

Thermal instability of InGaAs/InGaAsP quantum wells
1990/04 InP and related compounds Conference

Very High Speed and Very Wide Tuning Range Optoelectronic Components
1991 Proceedings Telekom'91

Very low threshold current density GaInAs/AlGaInAs MQW alsers made by Phosphorus-free MBE and
1989/12 Electronic Letters 25

R1059 DIVIDEND - Dealer Interactive Video

Advanced Telecommunications in Financial Services
1990/09 Public and Private Sector seminar hosted by the Irish Science and Technology Agency

Broadband Technology Earns Dividend
1989/10 Journal of Institution of Engineers in Ireland

RACE DIVIDEND - An application for the city
1993/01 BT Technical Journal

Requirements for advanced communications in the financial dealing sector
1991/06 13th International Teletraffic Congress

The use of broadband communicaitons in a financial dealing environment
1990/10 IEE conference on Integrated Broadband Services and Networks

When will teleconferencing take off in banking
1992/04 European Teleconferencing '92 - Paris

R1060 Distributed Industr. Design & Manufacturing of Elect. Subassemblies

Broadband Technology within the DIDAMES project
1990/10 Proceedings of the IEE conference on Integrated Broadband Services & Networks

Das BERKAPS-Projekt - PC-Integrierte Videokonferenz-Systeme
1991/10 Breitbandkommunikation im Glasfasernetz, DETECON - Berlin

Future IBC-based Teleconference Workstations
1988/06 Conference proceedings for OMA '88, Deutsche Informatik Akademie

Open Security Technology and Electronic Data Interchange - The EDI Security Applications Model EDISAM
1991 Springer Verlag, ISBN 3-540-53478-4 - Berlin

TELES.VISION - Philosophy and Technology
1991 TELES GmbH - Berlin

The DIDAMES User Interface
1990/03 URM (R1077) publication The User - TELES- Berlin

The Exploitation of the DIDAMES Project Results
1992/05 TELES GmbH - Berlin

The Infrastructure Model of Workstations in IBCNs - Mass Market and International Standardization
1989/09 TELES Technical Report

Videoconferencing and TELES.VISION - Concepts and Contexts
1992 TELES gmbH - Berlin

R1061 Distributed Integrated Multimedia Publishing Environment

An application of broadband networks in the publishing world. The DIMPE project
1990/10 Conference proceedings - Integrated Broadband Services and Networks

IFRA Newspaper Techniques
1991/09 Conference Proceedings/Exhibition/Journal

Maxwell Focuses on ISDN
1991/01 Electronic Publishing News

Multi Media: A publisher's Perspective
1991/07 Presentation to Multimedia Information, the Second International Information Research Conference.

Projet Europeen DIMPE: les canards passent à la vitesse superieure
1992/01 LES ECHOS

Technology Spurs Publishing Boom
1991/03 The European Newspaper

The DIMPE (Distributed Integrated Multimedia Publishing) Project
1991/11 Conference Proceedings

R1062 MARIN - ABC

A Decision Support System for Tele Diagnosis and Remote Maintenance
1992/09 8th International Symposium IMEKO-TC - Dresden

Bildkommunikation via Satellit auf offener See
1992/01 Visuell 1/92 (German Telekom House Publication)

Marine Industry Application of Broadband Communication (MARIN-ABC)
1990/12 Telematics '90 - Proceedings of the Conference held at Bremen

Multimediale Unterstuetzung von Wartungs- und Reparaturaufgaben
1992/10 Telematics '90 - Proceedings of the Conference held at Bremen

Outlook Shipping & Banking
1992/08 Special Report on Communications - Posidonia Fair, Piraeus

The MARIN-ABC Project
1992/05 Hellenic Institute of Marine Technology, Seminar on Information Technology in Shipping

The second generation of maritime computarization and communication
1991/11 Second International Conference of the Institute of Marine Engineers - London

R1064 Monolithic Integrated Optics for Customer Access Applications

Breagg grating add-drop optical multiplexers for InP based optoelectronic integrated circuits
1991 Integrated Photonics Research 1991, Monterey USA, Paper TuD12

Integrated laser and add-drop optical multiplexer for narrowband wavelength division multiplexing
1992/04 Electron. Letters Vol 28, No 8 pp 712-3

Low Current Plasma Effect Optical Switch on InP
1990/01 Electronics Letters, Vol 26 No 2

R1065 ISSUE - IBC Systems and Services Usability Engineering

General Aspects of the Usability of Videocommunications
1990/04 Proceedings of the Ergonomics Society's 1990 Annual Conference, Taylor & Francis, London

Guidance in successful Videoconferencing
1993/05 14th Symposium of Human Factors in Telecommunications - Darmstadt

Helping IBC Designers to Help Themselves
1993/05 14th Symposium of Human Factors in Telecommunications - Darmstadt

Human factors analysis in a multipoint videotelephone system
1992 COST 212 Final Report - CEE - Luxembourg

Human Factors Aspects of Video Control in a Multimedia Environment
1990/11 IEEE Multimedia 90

Human Factors in Telecommunications Services : an overview
1992/11 Communications, I+D

Human Factors Studies of Multimedia Presentation in HD Screens
1990/11 Conference proceedings of Multimedia 90

IBC Systems & Services Usability Engineering - The RACE ISSUE Project
1992/05 CHI 92 - Monterey, CA

Investigation of Reduced Information Content in HD Still Image Presentation
1992 COST 212 - HUFIS - Final Reports - ISBN 92-826-4132-5

Is the Failure of Videoconferencing Uptake due to a lack of Human Factors or Poor Market Research?
1990/09 13th International Symposium Human Factors in Telecommunications

Multimedia presentation in HD screens: Two Human Factors Studies
1990/11 IEEE Multimedia 90

Pictograms in Multipoint Videotelephony : an International Study
1992 Contemporary Ergonomics

The Effects of turn-taking in multipoint videotelephony
1992 Contemporary Ergonomics

The Role of Human Factors Experimentation in the Development of IBC systems
1990/09 13th International Symposium Human Factors in Telecommunications

Usability of Videocommunications in the RACE ISSUE Project
1990/09 13th International Symposium Human Factors in Telecommunications

Videocommunications in the 1990s
1990/10 IEEE Conference, IT & People

R1066 IPSNI - Integration of People with Special Needs by IBC

Eye gaze input systems for IBC terminals - The motor handicapped perspective
1990/09 13th International Symposium on Human Factors in Telecommunication

Future possibilities for multimedia Terminals
1990/06 Tijdschrift van het Nederlands Elektronica-en Radiogenootschap

Integration of people with special needs in IBC - RACE project R1066 IPSNI
1990/09 13th International Symposium on Human Factors in Telecommunication

The RACE Project on Integration of people with special needs on IBC
1990/11 European Conference on the Advancement of Rehabilitation Technology - ECART

R1067 Usability Design Information Support for the Integration of IBC

A unified methodology for the design of telecommunication services
1993/04 Special Issue of Ergonomics in Telecommunications

A verification of the evaluation tools for evaluating multimedia co-operative authoring emulation
1990 Proceedings of the International Conference on Integrated Broadband Services and Networks

Conceptual framework for service definition
1991 Integrated Broadband Communications: Views from RACE - Usage Aspects, Elsevier

Design Principles for Improving Service Integration for End-Users in Broadband Communications Systems
1992/09 Proceedings of the HCI 92

Designing a usable IBC system - Results of using the Guidance Method
1993/05 14th International Symposium on human factors in telecommunications

Designing IBC services which enable users to reach their goals
1992 Proceedings of the European Conference of Cognitive Ergonomics (ECCE6)

Developing usability integration principles for IBCN systems
1990 European Conference on Cognitive Ergonomics 5

Emulation of a multimedia workstation for the investigation of principles in design for usability
1990 Proceedings of Human Factors in Telecoms Conference 1990

Enabling States: a new approach to usability
1990 Proceedings of Human Factors in Telecoms Conference 1990

Enabling States Analysis - Gestaltung benutzbarer Gruppenarbeitssysteme
1991 Tagugsunterlagen der Ersten Fachtagung Computergestuzte Gruppenarbeit

HyperQuery-Ein Anfragesystem mit Graphischer Benutzeroberflaeche
1991 Information Retrieval. Informatik Fachberichte 286, Springer

Integration of Services for Human End Users: A study of cooperative work
1991 Integrated Broadband Communications: Views from RACE - Usage Aspects, Elsevier

Integration of Services for Human End Users: Enabling States
1991 Integrated Broadband Communications: Views from RACE - Usage Aspects, Elsevier

The Enabling States Approach: Designing Usable Telecommunications Services
1991 IEEE Journal on Selected Areas in Communications

The requirements of service designers
1991 Integrated Broadband Communications: Views from RACE - Usage Aspects, Elsevier

R1068 ROSA-RACE Open Services Architecture

ROSA-RACE Open Services Architecture
1989/07 SETSS '89

R1069 Enhanced Performance Lasers for Optical Transmitters

1.55 μm gain-coupled quantum-well distributed feedback lasers with high single-mode yield and narrow
1991 IEEE Photonics Technol. Lett., Vol. 3

1.57 μm strained-layer quantum well GaInA1As ridge-waveguide laserdiodes with high temperature (130..
submitted for publication

A comparison of MOVPE grown strained and unstrained MQW lasers incorporating continuously graded, step
1992/06 6th Int. MOVPE Conf., Cambridge Mass., published in J. Crystal Growth, Vol. 124

A fundamental limit for the feedback sensivity of semiconductor lasers
1990/09 IEEE International Semiconductor Laser Conference

A high speed integratable 1.3 μm laser
1990/03 SIOE'90

A high speed laser structure for OEICs
1991/09 OE Fibers

A high speed low capacitance laser structure for integration
1991/04 Indium Phosphide and Related Materials

A high speed, self aligned, 1300 nm buried ridge laser suitable for integration
1990/10 IEE Proceedings Part J, vol 137

A new DFB-laser diode with reduced spatial holeburning
1990/06 IEEE Photonics Technology Letters, vol. 2

Analysis and design of grating - assisted codirectionally coupled laser diodes
1992/03/04 SIOE'92, Cardiff

Analysis of antireflection coatings on angled facet semiconductor laser amplifiers
1990 Electronics Letters, Vol 26

Analysis of gain coupled DFB lasers
1991/04 IPR-91

Band mixing effects in strained layer semiconductor lasers
1991/05 CLEO'91

Basic analysis of AR-coated, partly gain coupled DFB lasers : The standing wave effect
1992 IEEE J. Quantum Electron., Vol. QE-28

CLADISS, a longitudinal multi-mode model for the analysis of static, dynamic and stochastic behaviour of diode
1990/10 IEEE Journal of Quantum Electronics, Vol. QE-26

CLADISS, a new diode laser simulator
1990/03 Topical Meeting on Integrated Photonics Research, Hilton Head

Comparative analysis of growth rate reductions on shadow masked substrates
1991 Appl. Phys. Lett., Vol 59

Comparative analysis of growth rate reductions on shadow masked substrates
1991 Appl. Phys. Lett., Vol 59

Comparative study of the reflectivity of coated and angled facets
1990/03 Topical Meeting on Integrated Photonics Research, Hilton Head

Coupling coefficients in gain coupled DFB lasers: Inherent compromise between coupling strength and loss
1991 IEEE Photonics Technol. Lett., Vol 3

Design and fabrication of two layer anti-reflection coatings for semiconductor optical amplifiers
1990 Electron. Lett, Vol 26

Design of index coupled DFB lasers with reduced longitudinal spatial holeburning
1991 IEEE J. Lightwave Technol., Vol. 9

Design of index coupled DFB-lasers with reduced longitudinal spatial holeburning
1991 IEEE J Lightwave Technol

Determination of the gain and saturation characteristics of a semiconductor laser amplifier using a ringlaser
1990/08 Optical Amplifiers Meeting, Monterey and ECOC Amsterdam

Direct measurement of the transparency current and valence band effective masses in tensile and
1992 Appl. Phys. Lett., Vol 60

Direct modulation 565 Mbit/s PSK heterodyne system with solitary SL-QW-DFB lasers using novel suppersion
1992 Electron. Lett., Vol. 28

Direct modulation 565Mb/s DPSK experiment with 62.dB loss span and endless polarization control
1992 IEEE Photonics Technol. Lett., Vol. 4

Direct modulation 565Mb/s DPSK experiment with endless polarization control and 60.5dB loss span
1992/09 ECO'92, Berlin

Direct modulation 565Mb/s PSK heterodyne system with solitary SL-QW-DFB lasers and novel suppression of
1992/09 ECO'92, Berlin

Effects of nonlinear gain on four-wave mixing and asymmetric gain saturation in a semiconductor laser amplifier
1991 Appl. Phys. Lett., Vol 59

Fabrication and performance of laser amplifiers with and without misaligned stripes
1990 Philips Journal of Research

Gain-coupled DFB lasers versus index coupled and phase shifted DFB lasers: a comparison based on spatial
1991 IEEE J. Quantum Electron., Vol QE-27

Gain-coupled DFB lasers versus index coupled and phase shifted DFB lasers : a comparison based on spatial
1991 IEEE J. Quantum Electron., Vol QE-27

GRIN-SCH MQW lasers incorporating graded GaAlInAs confinement layers
1989/10 Electronics Letters, Vol. 25

Growth velocity variations during metal organic vapor phase epitaxy through an epitaxial shadow mask
1990/07 Applied Physics Letters, vol 57

High gain strained-layer InGaAs/InGaAsP MQW laser amplifiers
1990/09 IEEE International Semiconductor Laser Conference

High performance 1.55 μm quantum-well metalclad ridge-waveguide distributed feedback lasers
1991 Jpn. J. Appl. Phys., Vol. 30

High performance 1300nm polarization insensitive laser amplifiers employing both tensile and compressive
1992/09 Post Deadline Paper, ECO'92, Berlin

High performance laser amplifiers at 1.5 μm using E-gun evaporated hafnium di-oxide coatings
1990/02 Japanese Journal of Applied Physics, Vol. 29

High-performance 1.5 Em wavelength InGaAs-InGaAsP strained quantum well lasers and amplifiers
1991 IEEE J Quantum Electron., Vol QE-27

Improved DFB laser characteristics by using a loss grating
1991/09 ECOC/IOOC

Improved performance 1.5 Em wavelength tensile and compressively strained InGaAs-InGaAsP quantum well
1991/09 ECOC/IOOC

Improved performance of AR-coated DFB-lasers by the introduction of gain-coupling
1990/03 IEEE Photonics Technology Letters, Vol 2

Influence of spectral hole burning on the linewidth enhancement factor in semiconductor lasers
1990/02 IEE Proceedings Part. J., Vol. 137

Integratable, high speed buried ridge DFB lasers fabricated on semi-insulating substrates
1991 Electron. Lett., Vol 27

Intensity noise measurements for 1.55 μm multi-quantum-well DFB laser diodes with external optical
1992/09 ECO'92, Berlin

Lateral bandgap engineering for InP-based photonic integrated circuits
1992/04 Indium Phosphide and Related materials

Lateral bandgap engineering using shadow masked growth
1991/04 IPR-91

Linewidth and feedback sensitivity of semiconductor diode lasers
1990/12 IEEE Journal of Quantum Electronics, Vol. QE-26

Linewidth of single mode DFB lasers in the presence of spatial and spectral hole burning
1989/09 European Conference on Optical Communication (ECOC)

Linewidth rebroadening in DFB-lasers due to a bias dependent dispersion of the feedback
1991 Electron. Lett., Vol 27

Long Wavelength GRIN-SCH MQW lasers incorporating graded GaAlInAs confinement layers
1990/04 Journal of Electronic Materials, Vol. 19

Low threshold current MOVPE grown GaInAs/Al(Ga)InAs separate confinement heterostructure multiquantum
1990/09 IEEE Photonics Technology Letters, Vol. 2

Modelling of antireflection coatings on angled facet semiconductor laser amplifiers
1990/02 IEE colloquium on Modelling of Optoelectronic Devices

Multiwavelength InGaAs/InGaAsP strained-layer MQW-laser array using shadow masked growth
1992 IEEE Photonics Technol. Lett., Vol. 4

Narrowband optic filter using a strained layer quantum well DFB laser diode
1993/03 Integrated Photonics Research, Palm Springs

Non-planar MOVPE growth using a new shadowmasking technique
1990/06 IC-MOVPE 5

Novel single laser coherent transceiver with a semiconductor optical amplifier as signal booster
1992/09 ECO'92, Berlin

On the distinctive features of gain coupled DFB lasers and DFB lasers with 2nd order grating
submitted for publication

Operation of a semiconductor unidirectional ring laser with an external cavity
1991/01 IEE Colloquium on Sources for Coherent Systems

Partly gain-coupled versus λ/4 shifted-DFB laser: a comparison
1990/09 IEEE International Semiconductor Laser Conference

Polarization insensitive 1300nm laser amplifiers employing both compressively and tensile strained quantum
1993/04 InP and Related Materials, Paris

Prediction of the linewidth floor in DFB lasers
1990/01 OFC'90

Reflectivity of coated and tilted semiconductor facets
1991 IEEE J Quantum Electron., Vol QE-27

Shadow masked growth and its applications
1992/09 OE/FIBERS'92, Boston

Shadow masked growth for photonic integrated circuits
1990/10 SPIE Conference on Physical Concepts for Materials for Novel Optoelectronic Device Applications

Side-emitting GaAs/AlGaAs SQW LEDs showing wide spectrum using shadow masked growth
1992 Electron. Lett., Vol. 28

Static and dynamic characteristics of MOVPE grown 1585 InGaAas/InGaAlAs SCH-MQW MCRW lasers
1991 Jpn. J. Appl. Phys., Vol 30

Strained layer quantum well laser with simultaneous high power and narrow linewidth
1993/02 OFC/IOOC'93, San José

Study of efficiency and linewidth of gain coupled DFB lasers with loss or gain grating
1992/03/04 SIOE'92, Cardiff

The growth and characterisation of GaInAs/GaInAsP and GaInAsP(LAMBDA1)/GaINAsP(LAMBDA2),
1991/04 Fifth Biennial Workshop on OMVPE

The influence of active-layer uniformity and linewidth-broadening factor on single-mode tuning in DFB lasers
1992/03/04 SIOE'92, Cardiff

The MOVPE growth of GaInAsP and GaInAsP and GaAlInAs based GRIN-SCH-MQW lasers incorporating
1990/11 E-MRS STRASSBORG

Thickness variations during MOVPE growth on patterned substrates
1990/04 Journal of Electronic Materials, Vol. 19

Threshold gain of a grating - assisted codirectionally coupled twin-guide laser diode
1992/04 IPR'92, New Orleans

Two-segment multiquantum well lasers with 7nm tuning range and narrow linewidth
1992 Electron. Lett., Vol. 28

Ultrahigh speed (16GHz) and high temperature (100 C) operation of 1.57 μm SL-QW GaInAlAs
1992 IEEE International Semiconductor Laser Conference

Ultrahigh speed (16GHz) and high temperature (110..C) opeeration of 1.57 um SL-QW GaInA1As
1992/09 IEEE International Semiconductor Laser Conference, Takamatsu

Ultrahigh speed (16GHz) and high temperature (110..C) operation of 1.57 um SL-QW GaInA1As
1992/09 IEEE International Semiconductor Laser Conference, Takamatsu

Very low threshold current density (Al)GaInAs/Al(Ga)InAs laser structure grown by AP-MOVPE
1991/04 Indium Phosphide and Related Materials

Yield analysis of DFB-MCRW laserdiodes for coherent systems applications
1990/08 IEE Proceedings Part J, vol 137

Yield analysis of non-ar-coated DFB lasers with combined index and gain coupling
1990 Electronics Letters, Vol. 26

R1070 Testing Pay-per-View in Europe

A Pay-per-view expirement using D2MAC/Eurocrypt
1990/07 Proceedings from ACSA 90 pay services symposium

R1071 IBC Application Analysis

Research in Strategic Technology Markets : the RACE Programme
1988/09 ITMAR '88 conference

Research in Strategic Technology Markets : the RACE Programme
1989/05 UK Industrial market Research Society's 1989 Annual Conference

R1072 IBCN Testing Architecture for Conformance Assessment

A LOTOS based Test Language (TELL) and a Test Tool Architecture
1990/05 Proceedings Lotosphere Workshop

A theoretical and methodological framework to Conformance Testing
1990/07 GMD Technical Report no 471

An approach to a Conformance Testing Methodology and the COAST Test System
1990/10 3rd International Workshop on Protocol Test Systems (IWPTS)

Applicability of formal description techniques for test specification
1991/05 GMD Technical Report No 532

Concepts for the development of a conformance test tool
1990/05 GMD Technical Report no 438

IBC Protocol Conformance Testing: the ITACA approach
1990/10 3rd International Workshop on Protocol Test Systems (IWPTS)

IBCN Conformance Testing: the ITACA approach
1991 Proceedings IFIP TC 6, 3rd International workshop on Protocol Test Systems

Open Subsystems Testing
1990 Protocol Test Systems

Presentation of RACE project R1072 ITACA
1989/10 2nd International Workshop on Protocol Test Systems (IWPTS)

R1073 GEOTEL

GEOTEL
1990/06 The USER (Newsletter for Usage projects in RACE)

GEOTEL and Drawings Management
1991/10 Autocad Magazine

GEOTEL branche sur NUMERIS
1990/01 L'Ordinateur Individuel

GEOTEL, des banques de donnees en reseau pour le secteur petrolier et chimique
1989/10 INFOTECTURE

GEOTEL, les normes AFNOR
1990/11 Industries et Techniques

GEOTEL, les normes françaises dans leur version integrale
1990/09 AFNOR (The French Standard organisation)

GEOTEL, les normes Françaises en ligne
1990/05 ENJEUX (Afnor Newsletter)

The GEOTEL Human Interface
1990/11 The User Newsletter

The GEOTEL Interworking architecture
1991/03 The User Newsletter

R1075 TELEPUBLISHING

Anwendung des BERKOM-Referenzmodells fuer das RACE Projekt TELEPUBLISHING
1991/05 Workshop BERKOM Reference Model II

Applications in publishing
1991/11 Broadband Communications : Market Strategies - OVUM Report, Ovum Ltd. - London, UK

Aspekte und Trends des elektronischen Publizierens
1990/04 Informationstechnik : Computer, Systeme und Anwendungen, Ausgabe 4/90

Beschleunigung fuer Organvermittlung
1992/07 Interview with V. Reible, A. Kindt in "Der Tagesspiegel", No 14 251, Berlin - Germany

Breitband Inseln fuer Multimedia Anwendungen
1991/10 GI 91 Annual Conference "Telekommunikation und Multimediale Anwendungen der Informatik" -

Breitbandkommunikation im Publishing-Umfeld
1991/05 Deutscher Drucker, No 20

Broadband and integrated services in distributed working environments
1991/04 Proceedings COSTEL Multimedia Workshop

Distributed Publishing of Electronic Newspapers and Mailorder Catalogues
1991/10 GI '91 Annual Conference Telekommunikation und Multimediale Anwendungen der Informatik

Elektronisches Publizieren auf dem Weg zur Telekommunikation
1991/06 Forschung Aktuell, No 33-35

Global Telecommunications for the publishing and printing industry : Technology, research and pilot projects
1992/02 IMPRINTA 92, International Congress, Duesseldorf, Germany

Hypermedia Standards
1991/06 OII-Workshop, CEC DG XIII B

Individuelle elektronische Zeitung (Individualized Electronic Newspaper)
1990/11 3. DTP-Kongress in Berlin (Desktop Publishing Congress)

Innovative Telepublishing Anwendungen
1990 Proceedings of 3.DTP-Kongre· 1990.

Key broadband Technologies
1992/05 Dataquest, Interview, London - UK

Knowledge-based Cooperative Publication System
1991/10 4th International GI Conference

Konzepte zur Versionenverwaltung fAr die Hyperdokumentenerstellung in einer hypertextbasierten
1991/05 Proceedings Gi/SI/OCG Conference Hypertext/Hypermedia '91

Konzeptionelle AnsNtze fAr kooperative Applikationen
1990/04 Informationstechnik it: Computer, Systeme und Anwendungen, Ausgabe 4/90

Layoutplanung und hochauflisende Bildkommunikation
1989/10 Proceedings GI-Fachseminar Elektronisches Publizieren Systems 89

Opportunities using new media storage methods
1991/10 International Conference Prepress '91

Probieren geht ueber Studieren
1992/01 PC Woche, Special Desktop Publishing, IDG VErlag, Munich, Germany

Publishing as a broadband application
1990/10 IEE Conference Integrated Broadband Services & Networks

Publishing Tools Need Both: State-Oriented Version Support
1991/09 Proceedings 15th Annual International Computer Software & Applications Conference COMP-SAC

RACE Telepublishing
1990/11 Workshop Bundesverband Druck, Working Group Reproduction Techniques

RACE - Telepublishing
1991/10 BERKOM - Breitbandkommunikation im Glasfasernetz

Telepublishing
1990/01 Forschungsfuehrer, Technische Universitat Berlin

Telepublishing
1989/11 Telematikbrief Nr 3, FhG/ISI

Telepublishing, an application oriented broadband project
1990 IDATE conference 1990 - Proceedings

Telepublishing - an application oriented IBC project
1991/06 OII-Workshop CEC/DG XIII B

Telepublishing as a Broadband Application
1990/11 Proceedings 12th International Conference Key Technologies, Experiments, New Concepts

Telepublishing- ein Anwendungsprojekt im Breitbandumfeld
1991/10 GI '91 Annual Conference Telekommunikation und Multimediale Anwendungen der Informatik

The BERKOM Project
1991/03 IEEE Review

The Individualized Electronic Newspaper : An Application Challenging Hypertext Technology
1992/09 Conference "Hypertext und Hypermedia 1992 : Konzepte und Anwendungen auf dem Weg in die

The RACE Telepublishing Project
1989/10 Proceedings of International Press Telecommunication Council (IPTC), Working Party

The use of co-operation models for specification and design of user interface
1991/09 Proceedings of the Fourth International Conference on Human-Computer Interaction Human

Uebersicht Pilotprojekte : Einordnung, Technik und Bedeutung
1991/11 4th DPT Congress - Berlin, Germany

Verteilte Produktion und Seitengestaltung von individualisierten Publikationen
1990/11 GI-Workshop Multimediale elektronische Dokumente

R1076 REMUS - Reference Models for Usability Specifications

Designing for Usability - The development of the REMUS Database
1990/09 Human Factors in Telecommunications, 13th International Symposium

Usability Issues and Solutions in IBC
1991/10 TELECOM 91

R1077 Usage Reference Model for IBC

A Unified Method for the Design of Telecommunication Services
1992/08 Ergonomics Special Issue, Telecommunication Industry

Applications Analysis : Case-Study Results for European Organisations
1992/03 Elsevier - North Holland

Applications Analysis : The RACE Application Pilots
1992/03 Elsevier - North Holland

Commercial Issues in the Definition and Marketing of Broandband Services
1992/03 Elsevier - North Holland

Conceptual Framework for Usage of Telecommunication Services
1992/03 Elsevier - North Holland

Designers Requirements for Usage information in the development of a Usage Reference Model for IBC
1990/10 Proceedings of the IEE conference on Integrated Broadband Service and Networks

Designers Requirements in the development of a usage reference model for IBC
1990 Proceedings of Human Factors in Telecoms Conference

From ISDN to Broadband Services: First experiences from the RACE programme
1991/05 Proceedings of the Teleconference Europe '91

Generic User Services Defined
1992/03 Elsevier - North Holland

Glossary : A Guide to IBC Terminology from a Usage Perspective
1992/03 Elsevier - North Holland

IBC - Views from Usage
1991 Integrated Broadband Communications: Views from RACE Network and Engineering Aspects

Integrated Broadband Communications : Views from RACE : Usage Aspects
1992/03 Elsevier - North Holland

Integration of Services for Applications
1992/03 Elsevier - North Holland

Integration of Services for Human End-Users : Design Principles, Enabling States Analysis, and a Design
1992/03 Elsevier - North Holland

Modelling Advanced Communication Services
1991/04 The International Symposium on Subscriber Loops and Services

Modelling Broadband Services from a Usage Perspective
1990 Proceedings of Human Factors in Telecoms Conference

Multimedia Communications in CSCW
1991/07 Proceedings of Seminar:Computer Supported Cooperative Work

Piloting New Services
1992/03 Elsevier - North Holland

Public Infrastructure Design from a Usage Viewpoint
1992/03 Elsevier - North Holland

Stored programme controlled telecommunication services
1990 International Conference on Communications

Telecommunications from the usage point of view
1991 Integrated Broadband Communications: Views from RACE. Network and Engineering Aspects

The Implications of Human Factors Recommendations for Network Infrastructure Design
1992/08 HFT, Darmstadt, 1993

The Usage Reference Model
1991 The Enabling States Approach : designing usable telecommunications services.

Usage oriented service design
1992/06 HFT, Darmstadt, 1993

Usage oriented service engineering
1992/08 International Symposium on subscriber loops and services, Vancouver, 1993

Usage Reference Model for Integrated Broadband Communications
1990/10 Proceedings of the IEE conference

R1079 CAR - CAR/CAM for Automotive Industry in RACE

A generic model for the use of high speed communications and CAD/CAM for design and manufacturability
1991/07 International Ergonomics Association, 11th Congress

A user-centred approach to define high-level requirements for next generation CAD systems for mechanical
1989/12 IEEE Transactions and Engineering Management Special Issue

An investigation into control protocols and use of video in a MULTIMEDIA task environment
1991/04 Ergonomics Society Annual Conference

An investigation into control protocols and use of video in a MULTIMEDIA task environment
1991/07 International Ergonomics Association, 11th Congress

An Investigation of User Requirements for Broadband Communications in the Automotive Industry
1990 Human Computer Interaction, Interact '90, Elsevier

An investigation of user requirements for broadband communications in the automotive industry
1990/08 Interact '90

Assimilating IBCN into CIM - some Human Factors aspects
1990/08 Human Factors in Design for Manufacturability in Process Planning (Hellander conference)

Communication and Interaction Issues in a Multi-Media Customer Facing System
1991/03 British Telecom FCTS Technical Workshop

Communications in the concurrent engineering paradigm - a European perspective invited paper in session,
1991/12 ASME 1991 Winter Meeting

Cooperative graphical applications in high speed networks
1991/10 Proceedings of the GI Conference - Darmstadt, Germany

Cooperative Sketching in a Network Environment for the Automotive Industry in Europe
1992 Eurographics '92 - Vienna, Austria

Design by Optimisation : Addressing Usability Problems in Multimedia Conferencing Systems
1993/04 Inter CHI 93, Amsterdam

Design to Product. A prototype of a system to enable Design for Manufacturability
1992/05 Chapter in "Human Factors in Design for Manufacturability", ed M. Helander and Mitsuo

Evaluating complex systems: the application of Heisenberg's uncertainty principle
1991/07 International Ergonomics Association, 11th Congress

First computer vision symposium
1991/06 ESA

Formal Specification and Design of an On-line Product Catalogue
1991/09 Journal of Computer and Software Engineering

Formal Specification and Design of an Online Product Catalogue
1992/04 Journal of Computer and Software Engineering

Future Communications Services in the Automotive Industry
1993 BT Technology Journal

Human Factors Implications of the 'Distributed Enterprise'
1992/05 Journal of Engineering Computers

Human factors in concurrent engineering
1991/07 International Ergonomics Association, 11th congress

IBC and Co-operative Working in the Automotive Industry
1990/09 Computer Supported Co-operative Work, Multi-User Interfaces and Applications

IBC Networks: Security from the users view
1990/10 International Conference on Integrated Broadband Services and Networks

Kooperative graphische Anwendungen in Hochgeschwindigkeitsnetzwerken
1991 Proceeding GI '91 - Darmstadt

Management of Technical and Organisational Change in large scale CIM systems
1990/08 Human Factors Aspects of Advanced Manufacturing & Hybrid Automation

Managing Screens and Interactions : Observations on the use of Multimedia Conferencing
1992/11 ACM Conference on CSCW - Toronto

Managing the organisations knowledge resources
1989/09 Proceedings of 3rd International Conference on Human-Computer Interaction

Module for the DTI Awareness Programme for Strategic Manufacturing - Man Machine Interfacing
1992/03 HCI and User Interface Design - Institute for Electrical Engineers

Multi media interactive working in design to manufacture
1990/05 Proceedings of 22nd International Symposium on Automotive Technology and Automation

Multi-Media Collaborative Working in the Automotive Industry - The role for Broadband Communications
1992/04 Ergonomics and Design Colloquium - East Midlands Ergonomics Group of the Ergonomics Society

Multimedia Collaborative Working in the Automotive Industry - The Role for Broadband Communication
1990/05 Proceedings of the CIM Europe Conference

Multimedia Conferencing as a Tool for Collaborative Writing : A case study
1991/11 Proceedings of the CSCW SIG Seminar on Collaborative Writing

Multimedia Conferencing : From Prototype to National Pilot
1992/06 Proceedings of INET '92 Conference - Kobe

Multimedia interactive working in design to manufacture
1991/09 4th IFIP Conference on computer applications in production and engineering

New Applications in High Speed Networks for the European Automotive Industry (in German)
1991/10 Annual GI Conference 91 - Darmstadt, Germany

Problems of Designing Task-Based User Interfaces for large-scale CIM systems
1992/05 Computer-Integrated Manufacturing Systems, Butterworth-Heinemann Ltd, Vol 5 No 2, 91-96

RACE CAR - New applications in High Speed Networks for the European Automotive Industry
1991/10 Proceedings of the GI Conference 91 - Darmstadt, Germany

Some Multimedia Traffic Characterisation and Measurement Results
1992/04 Networks '92 - Trvandrum, India

The Open Multimedia System Architecture : An overview
1992/05 The Computer Journal

User requirements specifications for workstations incorporating high speed broadband communications links
1990/08 Human Factors Aspects of Advanced Manufacturing & Hybrid Automation

R1080 HDTV Experimental Usage

HD tape to film transfer
1992/02 SPIE/IS & T - San Jose, US

HDP/HDQ processing in an Experimental Digital HDTV studio
1992/06 Les assises des jeunes chercheurs - Tokyo

HDTV production and postproduction : an original compatible digital approach
1992/06 FKTG Berlin

Progress on development of studio equipment for progressively scanned 1250/50 HDTV
1991/02 Document TG 11/1, Document TG 11/2

Progress on HDTV standard conversion
1991/02 Document TG11/1. Document WP11/A

Progress report on the 1250/50/2 system
1991/01 Document : TG 11/1

Transferring to film
1991/09 HDTV Dublin

Vision 1250, A European economic interest grouping
1991/02 Document TG 11/1

R1081 BUNI - Broadband User/Network Interface Demonstrator

An European Demonstrator and Test-bed for the Broadband User/network Interface
1993/01 BT Technical Journal

Broadband User-Network Interface Projects in RACE
1990/10 International Conference on Integrated Broadband Services and Networks, IEE

R1082 Qual. of Serv. Verif. Method. & Tools for Integr. Broadband

ATM technology
1990/10 7th Congress de Nouvelles Architectures pour les Communications

QoS in Broadband Networks
1990/06 NETWORKS '90 conference

Some aspects of quality of service
1991 13th ITC Conference

R1083 PARASOL - ATM Specific Measurement Equipment

A Model for Real-Time Generation of ATM Traffic from a Large Number of Sources
1990/08 9th Nordic Teletraffic Seminar

ATM Measurement Tool
1990/08 9th Nordic Teletraffic Seminar

ATM Traffic Processes: A Model for Real-Time Generation
1990/09 Technical Seminar on B-ISDN

Bitfehlerstrukturanalyse in der Breitband-ISDN-Me·technik
1991 Nachrichtentechnische Zeitschrift 44

Correlation in ATM traffic streams
1991/06 Queuing Performance & Control in ATM

Guaranteeing B-ISDN transmission quality internationally
1991 Telcom Report International 14, No 2

Me·prezision auf breitem Band
1991 Telcom Report 14, Heft 2

Measurement precision over broadband
1991 Telcom Report 14, No 3

Messtechnik fÁr zukÁnftige Breitbandsysteme
1990/12 Nachrichtentechnische Zeitschrift ntz.

Network performance measurements in ATM systems
1991/08 Telecommunications

Testing in the ATM environment
1991/10 Communications International

Traffic generation for ATM systems testing environment modelling and feasibility studies
1991 ITC-13

Uebertragungsqualitaet im B-ISDN international sicherstellen
1991 Telcom report 14

R1084 MIME - Development of Emulators and Simulators

A high speed parallel simulator for ATM networks
1990/11 Proceedings of 4th RACE TMN conference

A high speed simulation engine for B-ISDN
1991/05 3rd Bangor Communications Symposium

A modular simulator for ATM based B-ISDN communication
1991/04 IEE conference

An ATM parallel simulator
1991/06 4th Greek National Confeence of Informatics

ATM Network Simulation Emulation Hybrid Systems
1990/11 2nd TMN Implementors Workshop

Broadband Network Simulation Using Parallel Transputer Technology
1990/10 RACE/IEE Conference - Publication No 329

Conservative parallel simulation of ATM networks
1991/11 5th TMN Conference

Contribution à la realisation d'un simulateur de reseaux ATM
1992/09 Thèse de Doctorat Un. de NICE-SOPHIA ANT

MEM for arbitrary exponential open network with blocking and multiple job classes
1991 Performance Engineering Workshop '91

Modelling of ATM networks
1991/11 5th TMN conference

Queueing Models of Packet-Sqitched Networks with Locally Adaptive Routing
1991 Performance Engin. Workshop '91

Simulation support for the Management Network
1992/09 6th TMN Conference

Switch Models for TMN applications
1992/09 6th TMN Conference

Unified representation of different Flow Control Methods
1991/11 5th TMN conference

R1086 TELEMED

Anwendung neuer Kommunikationskonzepte zur kooperativen Bearbeitung unterschiedlich strukturierter
1990/06 Berliner Herzkonferenz

Bridging the Gap: Using a Summary Primary Health Care Patient Record in Secondary Health Care
1990/12 Second European Conference on Health Services Research & Primary Health Care

Communication aspects in the RACE TELEMED Project
1990/11 12th International Conference

Communications between Hospitals and Remote Users
1990/04 IMIA working conference

Creation d'une banque de donnees europeenne inter-universitaire d'Imagerie Medicale

Design of a Cost-Effectivesness Analysis Study in Teleradiology
1991/07 CAR '91, 5th International Symposium & Exhibition

Design of a Portable software on X-Window for Interactive Image Analysis PACS Workstations
1990/06 EuroPACS 90

Experiences in picture communications in the medical field
1990/11 IDATE 12th International Conference: Key Technologies, Experiments, New Concepts

High Speed Medical Applications
1989/05 Proceedings of EARN 89. An International Conference of Technical Aspects of networking and

Integration und Kommunikation von Patientenbefunddaten am Deutschen Herzzentrum Berlin
Einsatz der EDV im Gesundheitswesen S.164

Laboratory results - Reporting to General Practitioners
1990 Current Perspectives in Health Computing

Perspectives in Teleradiology
1991/06 IV Congr. Naz. Ass. Ital. Fisica Biomedica

Presentation of the TELEMED project
1990/10 RACE seminar (organised by Swedish Telecom)

Proposal of a Relational Model for a Radiological Scientific Data Base
1990/05 EuroPACS 90

Proyecto de una PACS en un Hospital pedi†trico con integracion en el proyecto TELEMED
1990/11 XX Congresso Nacional de Radiologia

RECPHONE: A new environment for medical remote expert consultation
1991/07 EuroPACS '91, 9th International Meeting

Scientific and Technological Experiences and Tendency of Medicine in Italy
1991/02 Teleradiology

Specifications for the Development of a Programming Environment for Remote Expert Consultation in Medicine
1991/05 3rd Panhellenic Conference on Computer Technology

TELEMED: First results from Europe's largest Broadband Communications Project in Telemedicine
1990/05 EuroPACS 90

Telemed: il ruolo della tecnologia fiorentina in un programma europeo di ricerca applicata
1991/03 Rotary Club Firenze Sud

Telemed: project within telemedicine
1990/02 2nd Information Technology Conference

Telemed: un progretto Applicativo
1991/01 Assolombarda

Teleradiology in Europe, EEC project TELEMED
1991/05 PACS and Teleradiology Conference

The RACE TELEMED Project R1086
1989/10 AIM Concertation Meeting

The robusness of communication of emotion via facial expression
1991 European Journal of Social Psychology

The TELEMED approach to terminology standardisation
1991/03 Workshop ECR-SCDI

The TELEMED project
1990/12 AIM Euroforum

The Teleradiology in Europe
1991/03 Milano Europa

Value Added and Data Services in Health
1990 Medical Informatics in Europe

Videoconference
1991/06 Informatica in Radiologia

R1087 PROVE - Provision of Verification

Architecture Modulaire de Test pour Reseaux ATM Large-Bande
1991/09 L'Onde Electrique - Vol 71 No 5 pp 34-39

Assynchroner Transfer-Modus : Grundbaustein fuer das Breitband-ISDN
1992 Nachrichtentechnik, Elektronik - Berlin - Vol 2-3-4

Modulare Testarchitektur fuer Breitbandige ATM-Netze
1992/02 NTZ : Nachrichtentechnische Zeitschrift - Helft 2, 45 Jahrgang, pp 88-97

Provision of Verification in RACE
1993/01 BT Technology Journal, Vol 11, No 1

RACE Partners all over Europe
1992/09 Clemessy "News Magazine" - No 2

Test architecture for Broadband Network
TE&M magazine (Geneva exhibition issue)

Test derivation for SDL based on ACTs
1992 FORTE 92 - 5th International Conference on Formal Description Techniques

The RACE to Test Broadband Nets
1991/09 TE&M : Telephone Engineer & Management - Vol 95 No 17 pp 68-72

R1088 TUDOR - Usability Issues for People with Special Needs

Attitudes and acceptance
1991 Chapter in Issues in Telecommunications for People with Disabilities, COST 219

Concerns of elderly consumers and their attitudes towards new technologies
1990/09 13th HFT Conference

Domestic Terminals
1991 Future Telecommunications and Teleinformatics for Disabled People. Final report of COST 219

Elderly people in a new world: Attitudes to advanced communications
1991/08 Gerontechnology: First International Conference on Technology and Ageing

Picture Communication
1991/10 6th World Telecommunications Exhibition and Forum

Pilot Applications for Advanced Communication Technology in Care for the Elderly in Europe
1991/08 1st Internationa Conference on Technology and Ageing

RACE projects: APPSN and TUDOR
1990/06 Telematics '90 - Proceedings of the Conference held at Bremen

Remote Working in the United Kingdom
1991 Future Telecommunications and Teleinfomatics for Disabled People. Final report of COST 219

Telecommunications needs as expressed by elderly people and people with disabilities
1991 Chapter in Issues in Telecommunications for People with Disabilities, COST 219

The interface between the elderly and new technology
1990/04 BPS Annual Conference

The Role of Human Factors in Designing for Special Needs
1990/05 Belgium Ergonomics Society Journal

Uability Issues for People with Special Needs with Regards to IBC
1990/04 Institute of Electrical Engineers

R1089 LOOP - Low-cost Optimised Optical Passive Components

Achievements of Both Low Cost, Low Loss and Very Low Reflection for a New European Connector
1991/03 French-German Workshop on Optical Measurements Techniques and Fibre Optics Conference

Connecteur monomode à hautes performances et à faible cout = Application au Reseau Large Bande
1991/03 OPTO '91

High performance and low cost passive optical components for the subscriber loop
1991 IWCS 1991

Low cost wavelength independent 1 x N and N x N Branching Components
1991 ECOC 91 Proceedings

Low Reflection Receptacles for Active Devices
1992/05 42nd Electronic Components and Technology Conference - San Diego, CA - USA

Passive components for multichannel networks
1991/02 Technical Digest of OFC 91

Silicon-based fibre-pigtailed 1x16 and 2x16 power splitters
1992/09 ECOC 92 - Berlin

R1091 ESP - Exploitation and Service Project

Contributions to the integration of advanced applications with high-speed protocols - RACE 1091 ESP
1991/05 RARE 2nd European Networking Conference

ESP - Exploitation of RACE I Application Pilots
1991/06 Networks 91

Perspektiven zu einem europNischen IBC
1990 TUBKOM-Kolloquium Breitbandtechnik

Prototyping Multimedia Tele-Services
1991/06 R1022 Technical Committee Workshop

Transportprotokoll Profile und erweiterte Transport Service fÁr integrierte Breitbandnetze
1990 Vorschlag des RACE Projectes 1091 ESP, TUBKOM-Kolloquium Breitbandtechnik

What Infrastructure do the RACE Advanced Communication Experiments Need
1990/06 RACE Broadband Islands Workshop

R1092 DIRAC - Database for Reliability Calculations

DIRAC - A Component Reliability Database
1991 Proceedings of ESREF 91

European Database for Component Reliability in Telecommunications
1990/06 Proceedings of 7th International Conference on reliability and maintainability

R1093 ROSA - RACE Open Services Architecture

Introduction to Algebraic Specifications based on ACT ONE
1989/12 GMD Technical report

Object-Oriented Service Descriptions in ROSA
1991/04 Proceedings of the TINA Workshop

Platform Modelling Requirements from the ROSA Project
1992/01 Proceedings of the TINA Workshop

ROSA: An Object Oriented Architecture for Open Services
1990/10 British Telecom Technology Journal

ROSA: An Object-Oriented Architecture for Integrated Broadband Communication Services
1990/06 Proceedings of the TINA workshop

ROSA: From the service to the Architecture
1991/06 Proceedings of the TINA Workshop

ROSA - RACE Open Services Architecture
1989/07 Proceedings of SETSS '89

Suggestions for Object Oriented Modelling form ROSA
1992/01 Proceedings of the TINA Workshop

The ROSA Object Model
1991/10 Proceedings International Workshop on Open Distributed Processing

Towards a Convergence between Telecommunication Services Architectures and ODP
1991/10 Proceedings International Workshop on Open Distributed Processing

Annex IV

RACE Patents Registered

RACE PATENTS REGISTERED

PROJECT :	R1010
PAT-TITLE :	Modulierbare Laserdiode für hohe Frequenzen
PAT-AUTHOR :	Siemens
DATE :	1992/07/08
COUNTRY :	Germany
OBSERVATIONS :	German Patent Application P 42 22 466.7 - GR 92 P 1393 DE

PROJECT :	R1010
PAT-TITLE :	Abstimmbarer Halbleiterlaser
PAT-AUTHOR :	Siemens
DATE :	1989/02/15
OBSERVATIONS :	European Patent Application 89 10 25 96.7 - GR 89 P 1075.E. Corresponding applications in Japan and USA.

PROJECT :	R1010
PAT-TITLE :	Doppel-PIN-Photodiode mit sperrendem p-n-Übergang zwischen Substrat und Absorptionsschicht
PAT-AUTHOR :	Siemens
DATE :	1989/03/17
COUNTRY :	Germany
OBSERVATIONS :	German Patent Application P 39 08 886.3 - GR 89 9 1181 DE

PROJECT :	R1010
PAT-TITLE :	Monolitisch integrierte Photodiode-FET-Kombination
PAT-AUTHOR :	Siemens
DATE :	1990/15/16
COUNTRY :	Germany
OBSERVATIONS :	European Patent Application 0 400 399 - GR 89 P 1457 E. Corresponding applications in Japan and USA.

PROJECT :	R1010
PAT-TITLE :	pin-FET-Kombination mit vergrabener p-Schicht
PAT-AUTHOR :	Siemens
DATE :	1990/06/11
COUNTRY :	Germany
OBSERVATIONS :	European Patent Application 0 405 214 - GR 89 P 1525 E. Corresponding applications in Japan and USA.

PROJECT :	R1010
PAT-TITLE :	Verfahren zur Herstellung eines dotierten Bereiches in einer Halbleiterschicht
PAT-AUTHOR :	Siemens
DATE :	1989/09/15
COUNTRY :	Germany
OBSERVATIONS :	European Patent Application 0 417 348 - GR 89 P 1770 E. Corresponding applications in Japan and USA.

PROJECT :	R1010
PAT-TITLE :	Verfahren zur Herstellung von FETs
PAT-AUTHOR :	Siemens
DATE :	1989/10/19
COUNTRY :	Germany
OBSERVATIONS :	German Patent Application P 39 864.4 - GR 89 P 1918 DE

PROJECT : R1011
PAT-TITLE : Verfahren zur Übertragungstechnischen Integration von ISDN-Kanälen mit einem breitbandigen asynchronen Zeitmultiplex-Kanal für digital betriebene Kommunikations-Vermittlungsanlagen

PROJECT : R1012
PAT-TITLE : Koppelnetz, bei dem Kurzwege schaltbar sind
PAT-AUTHOR : Siemens
DATE : 1992/08/06
COUNTRY : Germany
OBSERVATIONS : Patent No 92 11 34 50.8 - GR 92 P 1477 E

PROJECT : R1012
PAT-TITLE : Monolithisch integrierte Laserdiode-Wellenleiter-Kombination
PAT-AUTHOR : Siemens
DATE : 1989/05/24
COUNTRY : Germany
OBSERVATIONS : German Patent Application P 39 16 962.6 - GR 89 P 1404 DE

PROJECT : R1012
PAT-TITLE : Verfahren und Schaltungsanordnung für die Aufnahme und Weiterleitung nach einem asynchronen Transfermodus übertragen
PAT-AUTHOR : Siemens
DATE : 1990/08/10
OBSERVATIONS : Corresponding applications in Canada, Japan and USA. European Patent Application 90 11 54 17.9 - GR 90 P 1488 E.

PROJECT : R1012
PAT-TITLE : Verfahren zur Überwachung und Glättung von Datenströmen, die nach einem asynchronen Übertragungsverfahren übertragen worden
PAT-AUTHOR : Siemens
DATE : 1991/02/01
OBSERVATIONS : European Patent Application 91 30 08 07.4 - GR 91 P 8002 E (Coapplicant Plessey Research Roke Manor Ltd. Corresponding)

PROJECT : R1013
PAT-TITLE : Circuitry for regeneration and synchronization of a digital signal (P4025 004)
ABSTRACT : The invention describes a way to perform bitsynchronization of a data stream with respect to a local or masterlock in a mesochronous or plesiochronous environment (jitter, wander, static phase arbitrary).
The principle can be used from DC up to slightly above 1 Gbit/s, using available semiconductor technologies. It can be monolictically integrated, no chip-external components are needed.
This is done by oversampling (for medium frequencies) or tapped delay lines (for 1/TB>300 Mbits).
The correlation of subsequent samples (spaced < = TB/4) of the input signal used to evaluate the eye opening.
The eye opening is catched and tracked in a way that data are sampled in its middle.
In a first stage jitter and wander are overcome up to 1.5 bitlenghts; a second stage, working with bit clock, overcomes bigger jitter and wander, only limited by chip size, not by principle. The second stage is realized with FIFO, RAM or shift register structures.
A control clock, which processes the algorithm for catching and tracking, organizes a coordinated step of the two stages, if the first stage is going to reach its range limits. This is done without slips or biterrors --> Bit slip compensation.
PAT-AUTHOR : K.-D. Menk and H. Preisach - SEL ALCATEL ZFZ/NV
DATE : 14990/08/dd
COUNTRY : Germany

PROJECT :	R1015
PAT-TITLE :	Procédé et dispositif pour contrôler le débit de données d'un terminal couplé à un réseau de transmission de l'information
DATE :	1990/12/27
OBSERVATIONS :	Registration No (France) : 90 16330

PROJECT :	R1015
PAT-TITLE :	Procédé et dispositif de protection contre les erreurs bits et les pertes de cellules dans un reseau temporel asynchrone
ABSTRACT :	The ATM Adaption Layer of the Protocol Reference Model of the B-ISDN aims at ensuring the Time Transparency and the Information Transparency for the services, This patent describes a mechanism which deals with the Information Transparency. Based on an interleaving mechanism gathered with a Reed-Solomon error correcting code this patent provides a Convergence Sublayer format, the originality of zhich is the splitting of one cell payload on two rows of the interleaving array used together with the capacity of correcting errors and erasures.
PAT-CATEGORY :	IBC Customer Systems
PAT-AUTHOR :	Mr B. Guilbaud
DATE :	1991/06/25
COUNTRY :	France
OBSERVATIONS :	Registration No 91 07 797

PROJECT :	R1015
PAT-TITLE :	Procédé et dispositif pour le multiplexage asynchrone de donnéées sur des réseaux à support partagé
ABSTRACT :	Thanks to a flow control mechanism installed inside data sources connected on a small multiplexer, a file dimensioning is possible for both data source and multiplexer without assumptions on the other party, This mechanism is based on a counter inside the sourcem increased when data are sentm decreased at a regular rate. Further data can be sent only if the counter value is below a given threshold. This is an original application of the "leaky bucket" mechanism.
PAT-CATEGORY :	IBC Customer Systems
PAT-AUTHOR :	F. Adam
DATE :	1991/02/01
COUNTRY :	France
OBSERVATIONS :	Registration No (France) : 91 01171

PROJECT :	R1020
PAT-TITLE :	Bistable optic device utilising the thermo-optic effect in a polymer
PAT-AUTHOR :	D.J. Westland, V. Skarda, W. Blau, L. Costa

PROJECT :	R1020
PAT-TITLE :	Non-linear optical switch utilising organic conjugated materials and four wave mixing techniques
PAT-AUTHOR :	D.J. Westland, V. Skarda, W. Blau, L. Costa
OBSERVATIONS :	Ultra-fast all-optical switch

PROJECT :	R1027
PAT-TITLE :	A method for adjusting the operation on integrated optic devices
ABSTRACT :	A method for the adjustment of operation characteristics of integrated optical devices, which allows the recovery of a considerable fraction of devices, being initially out of tolerance, by depositing on the surface of the waveguide material, after the final processing step of the device, a suitable layer of transparent material.
PAT-CATEGORY :	Optical Communiation
PAT-AUTHOR :	C. Caldera, S. Morasca, C. de Bernardi
DATE :	1991/03/07
COUNTRY :	Italy, USA, Canada, Japan, GB, F, D, NL and Sweden
OBSERVATIONS :	Applicant : CSELA - It will be extended by March 1991 to USA, Canada, Japan, GB, F, D, NL and Sweden.

PROJECT :	R1027
PAT-TITLE :	Fabrication procedure for an integrated semiconductor structure
ABSTRACT :	The fabrication of a butt-coupled integrated photodectector-waveguide with high efficiency of the detector, is usually prevented by the poor quality of the regrown interface. To overcome this limitation, a special structure is proposed, with the photosensitive material grown on a double stepped waveguide/substrate surface; this structure is also made suitable the high optical power thanks to the insertion of a beam spreading region between the waveguide and the detector.
PAT-CATEGORY :	Optical Communication
PAT-AUTHOR :	L. Menigaux, A. Carenco, A. Scavennec
DATE :	1990/05/21
COUNTRY :	France
OBSERVATIONS :	Applicant : CNET

PROJECT :	R1031
PAT-TITLE :	High Speed Submount
PAT-AUTHOR :	H.P. Mayer, G. Luz
OBSERVATIONS :	German Patent No P4110378

PROJECT :	R1031
PAT-TITLE :	Laserwafer und Verfahren zu seiner Herstellung (Laser wafer and method for fabrication)
PAT-AUTHOR :	K. Dutting, K. Wünstel
COUNTRY :	Germany
OBSERVATIONS :	German Patent OE 3934748 and European Patent EP 423513

PROJECT :	R1031
PAT-TITLE	Dispositif semiconducteur intégré incluant un élément optoélectronique de commutation en forme de Y
PAT-AUTHOR :	Ph. Authier, M. Erman. LEP
DATE :	1988/06/27
COUNTRY :	UK, F, D, I, SW, NL
OBSERVATIONS :	Filed with the US, Japan and South Korea Patent Office and under the European Patent Convention

PROJECT :	R1031
PAT-TITLE :	Method for testing edge emitting semiconductor devices
PAT-AUTHOR :	K.H. Bihler, H. Hauer, B. Schwaderer
COUNTRY :	Germany
OBSERVATIONS :	Applied for German Patent under No P3916924

PROJECT :	R1033
PAT-TITLE :	Dispositif semiconducteur intégré incluant un commutateur optoélectronique
PAT-AUTHOR :	J.A. Cavailles, LEP
DATE :	1989/06/09
COUNTRY :	UK, F, D, I, NL, SW
OBSERVATIONS :	Filed with the US, Japan and South Korea Patent Office and under the European Patent Convention

PROJECT :	R1033
PAT-TITLE :	Dispositif semiconducteur intégré incluant un élément optoélectronique de commutation
PAT-AUTHOR :	M. Erman, LEP
DATE :	1988/11/28
COUNTRY :	UK, F, D, I, SW, NL
OBSERVATIONS :	Filed with the US, Japan and South Korea Patent Office and under the European Patent Convention

PROJECT :	R1033
PAT-TITLE :	Optical Devices (HBT Waveguides)
PAT-AUTHOR :	GEC
DATE :	1988/06/16
COUNTRY :	F, D, I, NL, SW
OBSERVATIONS :	Filed with the US Patent Office and under the European Patent Convention

PROJECT :	R1033
PAT-TITLE :	Verfahren und Vorrichtung zum dezentralen Aussenden von Information auf eine Uebertragungsstrecke
PAT-AUTHOR :	S. Rao, M. Potts, R. Beeler, ASCOM TECH AG
OBSERVATIONS :	Filed with the Swiss Patent Office (No 04 093/88-4)

PROJECT :	R1033
PAT-TITLE :	Dispositif semiconducteur comprenant un guide de lumière intégré qui présente au moins une partie rectiligne
PAT-AUTHOR :	Ph. Autier, M. Erman, J.M. Auger, LEP
DATE :	1988/06/27
COUNTRY :	UK, F, D, NL
OBSERVATIONS :	Filed with the US, Japan and South Corea Patent Office and under the European Patent Convention

PROJECT :	R1033
PAT-TITLE :	Dispositif semiconducteur incluant un coupleur directionnel pour les composantes TE, TM
PAT-AUTHOR :	J. Angenent, J.A. Cavailles, LEP
DATE :	1989/07/28
COUNTRY :	UK, F, D, I, SW, NL

PROJECT :	R1033
PAT-TITLE :	Uebertragungseinrichtung mit einer optischen Uebertragungsstrecke
PAT-AUTHOR :	P. Vogel, Th. Martinson, Ascom Tech AG
DATE :	1989/12/12
OBSERVATIONS :	Filed with the Swiss Patent Office

PROJECT :	R1033
PAT-TITLE :	Bit- und Rahmensynchronisiereinheit für einen Zugriffseinheit einer optischen Uebertragungseinrichtung
PAT-AUTHOR :	P. Vogel, Th. Martinson, ASCOM TECH AG
DATE :	1990/04/09
OBSERVATIONS :	Filed with the Swiss Patent Office (No 01 192/90-3)

PROJECT :	R1033
PAT-TITLE :	Code-Erkennungseinheit und Verwendung derselben
PAT-AUTHOR :	P. Vogel, Th. Martinson, ASCOM TECH AG
DATE :	1990/05/23
OBSERVATIONS :	Filed with the Swiss Patent Office (No 01 769/90-0)

PROJECT :	R1033
PAT-TITLE :	Optoelectronic assemblies (SiTHRU packaging)
PAT-AUTHOR :	I.R. Crostonm S.G. Tyler, GEC-Marconi
DATE :	1991/06/26
OBSERVATIONS :	Filed with the UK Patent Office

PROJECT :	R1035
PAT-TITLE :	Connectionless ATM Data Services
OBSERVATIONS :	Official publication of the application did not occur yet

PROJECT : R1038
PAT-TITLE : Vermittlungsunabhängiges Konferenzsystem (Audio/Video)
OBSERVATIONS : Application submitted by Alcatel SEL

PROJECT : R1038
PAT-TITLE : Videophone bei Multimedia mittels Umlenkspiegelanordnung
OBSERVATIONS : Application submitted by Alcatel SEL

PROJECT : R1038
PAT-TITLE : Videophone bei Multimedia - "Periskoplösung"
OBSERVATIONS : Application submitted by Alcatel SEL

PROJECT : R1041
PAT-TITLE : Hybrid-Codierer für Videosignale
PAT-AUTHOR : J. Speidel, P. Vogel
OBSERVATIONS : Patent No EP 0 244 01

PROJECT : R1041
PAT-TITLE : Verfahren u. Schaltungsanordnung zur Bitratenreduktion
PAT-AUTHOR : P. Vogel
OBSERVATIONS : Patent No DE 3631252 - EP 0 260 748

PROJECT : R1041
PAT-TITLE : Quellcodierer für Videobilder
PAT-AUTHOR : P. Vogel
OBSERVATIONS : Patent No DE 3710119 - EP 0 284 161

PROJECT : R1041
PAT-TITLE : System zur Übertragung von Videobildern
PAT-AUTHOR : P. Vogel
OBSERVATIONS : Patent No DE 3726520 - EP 0 290 085

PROJECT : R1041
PAT-TITLE : Verfahren zur Bestimmung von Bewegungsvektoren
PAT-AUTHOR : P. Vogel
OBSERVATIONS : Patent No DE 3727530

PROJECT : R1041
PAT-TITLE : System zur Übertragung von Videobildern
PAT-AUTHOR : P. Vogel
OBSERVATIONS : Patent No DE 3744280

PROJECT : R1041
PAT-TITLE : Schaltungsanordnung zur Auswertung eines Videosignals
PAT-AUTHOR : M. Riegel
OBSERVATIONS : Patent No DE 3809076 - EP 0 333 274

PROJECT : R1041
PAT-TITLE : Steuersignalgenerator für die Verarbeitung eines Videosignals
PAT-AUTHOR : M. Riegel
OBSERVATIONS : Patent No DE 3809075 - EP 0 333 275

PROJECT : R1041
PAT-TITLE : Prädiktiver Standbildcodierer
PAT-AUTHOR : K. Hienerwadel & G. Weth
OBSERVATIONS : Patent No DE 3811536 - EP 0 336 510

PROJECT : R1041
PAT-TITLE : Hybrid-Codierer für Videosignale
PAT-AUTHOR : K. Hienerwadel & G. Weth
OBSERVATIONS : Patent No DE 3811535 - EP 0 336 535

PROJECT : R1041
PAT-TITLE : Verfahren zur Speicherung und Wiedergabe von Videosignalen
PAT-AUTHOR : G. Weth
OBSERVATIONS : Patent No DE 38731277

PROJECT : R1041
PAT-TITLE : Speicher für Videosignale
PAT-AUTHOR : M. Riegel
OBSERVATIONS : Patent No DE 3838171 - EP 0 365 069

PROJECT : R1041
PAT-TITLE : Verfahren zur Bestimmung der Bewegungsvektoren einer Sequenz von Videobildern
PAT-AUTHOR : K. Hinerwadel
OBSERVATIONS : Patent No DE 3839502

PROJECT : R1041
PAT-TITLE : Schaltungsanordnung zur Filterung eines Videosignals
PAT-AUTHOR : K. Hinerwadel
OBSERVATIONS : Patent No DE 3917085

PROJECT : R1041
PAT-TITLE : Codierer für blocksweise Codierung von Videobildern
PAT-AUTHOR : P. Vogel
OBSERVATIONS : Patent No DE 3929280

PROJECT : R1041
PAT-TITLE : Schaltungsanordnung zur Bestimmung der Lage von extremalen Werten einer Ähnlichkesf
PAT-AUTHOR : K. Hinerwadel
OBSERVATIONS : Patent No DE 4009610 - EP 0 449 363

PROJECT : R1041
PAT-TITLE : Vorrichtung zur Steuerung einer Videokamera
PAT-AUTHOR : W. Demmer & G. Weth
OBSERVATIONS : Patent No DE 4012846

PROJECT : R1041
PAT-TITLE : Adaptives Filter zur Reduktion von Codierartefakten
PAT-AUTHOR : W. Demmer
OBSERVATIONS : Patent No 4017375

PROJECT : R1041
PAT-TITLE : Schaltungsanordnung zum Erkennen eines menschlichen Gesichts
PAT-AUTHOR : E. Badiqué
OBSERVATIONS : Patent No DE 4028191 - EP 0 474 304

PROJECT : R1041
PAT-TITLE : Anordnung zur Speicherung digitaler Farbbildsignale
PAT-AUTHOR : B. Friedrich
OBSERVATIONS : Patent No DE 4041821

PROJECT : R1044
PAT-TITLE : Multi-user Optical line Outlet
PAT-AUTHOR : Fussgänger (SEL)
DATE : 1990
COUNTRY : Germany
OBSERVATIONS : Exploitation of this patent will be "free of charge" to all participants in RACE Programme

PROJECT : R1044
PAT-TITLE : Optical Communication System for the Multi-Customer Access Area
ABSTRACT : Multi-Customer Optical Line Inlet/Multi-Customer Optical Line Outlet (MC-OLI/MC-OLO); Threefold WDM :
- High Density WDM (eg. 2-5 nm) for multi-customer signal transmissions
- Medium-Density WDM (eg. 65-85 nm) for bidirectional signal transmissions, and
- Low-Density WDM (eg. 185-235 nm) for optical integration of interactive (B)ISDN and distributive CATV service signals

PAT-CATEGORY : IBC Customer Systems
PAT-AUTHOR : Dr. Kurt Fussgaenger, SEL
DATE : 1989/90
COUNTRY : Germany, EC

PROJECT : R1064
PAT-TITLE : Integrierte optische Anordnung mit wenigstens einem auf einem Substrat aus Halbleitermaterial integriertem optischem Wellenleiter
DATE : 1989/09/01
COUNTRY : Germany
OBSERVATIONS : German Application P 39 29 131.6 - GR 89 P 1730 DE

PROJECT : R1064
PAT-TITLE : Monolithisch integrierter Schaltkreis mit einer DDB-Laserdiode, optischem Schalter und Wellenleiterverbindungen
DATE : 1990/05/03
COUNTRY : Germany
OBSERVATIONS : German Application P 40 14 234.5 - GR 90 P 1231 DE

PROJECT : R1064
PAT-TITLE : Steuerbarer integrierter optischer Richtkoppler
DATE : 1990/09/28
COUNTRY : Germany
OBSERVATIONS : German Application P 40 30 754.9 - GR 90 P 1725 DE

PROJECT : R1064
PAT-TITLE : Steuerbarer integrierter optischer Mach-Zehnder-Interferometer
DATE : 1990/09/28
COUNTRY : Germany
OBSERVATIONS : German Application P 40 30 755.7 - GR 90 P 1726 DE

PROJECT : R1064
PAT-TITLE : Passiver integrierter optischer Richtkoppler
DATE : 1990/09/28
COUNTRY : Germany
OBSERVATIONS : German Application P 40 30 756.5 - GR 90 P 1727 DE

PROJECT : R1083
PAT-TITLE : Method and Circuit Arrangement for Data Block Synchronisation in TDM Communiation System, particularly in an ATM
PAT-AUTHOR : S. Wahl, B. Cesar
DATE : 1991/07/12
OBSERVATIONS : (EP 91 111 615.0 12.07.91)

PROJECT : R1089
PAT-TITLE : Verfahren zum Absetzen von Kabeln, insbesondere Lichtwellenleiterkabeln
ABSTRACT : Cutting of aramid yarns for cable end preparation
PAT-AUTHOR : H. Deharde, J. Rogalla, J. Schulte
DATE : 1989/0
COUNTRY : Germany
OBSERVATIONS : Application Submitted

PROJECT : R1089
PAT-TITLE : Verfahren zum zugfesten Verbinden eines Steckers mit einem Lichtwellenleiterkabel
ABSTRACT : Procedure for the mounting of the crimp sleeve of an optical connector
PAT-AUTHOR: H. Deharde
DATE : 1990/01
COUNTRY : Germany
OBSERVATIONS : Application submitted

PROJECT : R1089
PAT-TITLE : Connecteurs pour fibres optiques à verrouillage et déverrouillage rapide
ABSTRACT : Design of the housing for a push-pull operating fibre optic connector
PAT-AUTHOR : E. Grassin d'Alphonse, S. Dubois, N. Valade
DATE : 1990/06/21
COUNTRY : France
OBSERVATIONS : Application submitted, extension to foreign countries planned

PROJECT : R1089
PAT-TITLE : Connecteur pour fibres optiques
ABSTRACT : Silicone-based membrane fixed inside the adaptor connecting 2 optical fibres
PAT-AUTHOR : L. Boillot, S. Boudard
DATE : 1990/01/29
COUNTRY : France
OBSERVATIONS : Application submitted, extension planned for European cointries and the US

PROJECT : R1089
PAT-TITLE : Oblique Fibre Cleaving
OBSERVATIONS : Application submitted

PROJECT : R1089
PAT-TITLE : Singleway re-enterable splice
OBSERVATIONS : Application submitted

PROJECT : R1089
PAT-TITLE : Design of compact fan-out with splitters
OBSERVATIONS : Application submitted in April 1992

Annex V

Glossary of technical terms

ATM - Asynchronous Transfer Mode.
CEPT - Conference of European Post and Telecommunications Organisations
CCIR - Comite Consultatif International des Radiocommunications of ITU
CCITT - Comite Consultatif International des Telegraphique et Telephonique - International Telephone and Tele
CFS - Common Functional Specifications
CODEC - Coder/Decoder
COST _ Co-operation in Science and Technology: A European multi-national framework for R&D co-operation.
CPN - Customer Premises Network
CREST - EC Committee on Research, Science and Technology.
DRIVE - EC R&D on Telematic systems in the area of Transport
EBIT - European Broadband Interconnection Trial
ECU - European Currency Unit
EDTV - Enhanced Definition Television
EFTA - European Free Trade Association
EL - Electro-luminescent
ESPRIT - European Strategic Programme of Research in Information Technologies
ETSI - European Telecommunications Standards Institute
EURESCOM - European Institute for Research and Strategic Studies in Telecommunications GmbH
GEN - General European Network: A 34 MBit/s fibre transmission Backbone
IBC - Integrated Broadband Communicatons
IC - Integrated Circuit
IN - Intelligent Networking
ISDN - Integrated Services Digital Network
ITU - International Telecommunications Union
HDTV - High Definition Television
LSI devices - Large-Scale Integrated devices
METRAN - Managed European Transport Network
MOU - Memorandum of Understanding
PNO - Public Network Operator
RACE - Research on Advanced Communications technologies for Europe
RMC - RACE Management Committee
SME - Small and medium-sized Enterprise
TMN - Telecommunications Management Network
UMTS - Universal Mobile Telecommunications System

Annex VI

Key references

Council Decision of 25th July 1985 on a definition phase for a Community action in the field of telecommunications technologies - R&D programme in advanced communications technologies for Europe (RACE): 85/372/EEC; O.J. No L 210/24; 7.8.1985

Council Decision of 14 December 1987 on a Community programme in the field of telecommunications technologies - R&D in advanced Communications technologies in Europe (RACE programme); 88/28/EEC: O.J. No L 16/35, 21.1.88.

Council resolution of 30th June 1988 on the development of the common market for telecommunications services and equipment up to 1992; 88/C 257/01: O.J. No C 257/1, 4.10.88.

Communication from the Commission to the Council and Parliament "Working towards Telecom 2000 - Launching the Programme RACE - COM(88) 240 final II of 31.5.88

Report of the IBC strategic Audit: "Establishing advanced communications in Europe". February 1989.

Communication of the Commission to the Council concerning R&D in Advanced Communications technologies for Europe (RACE) - Progress report '89 and 30-month review, SEC(89) Final, July 1989.

Annual technical reports on the RACE programme - RACE '88; RACE '89; RACE '90; RACE '91, and RACE '92 - Available on request from the RACE central office, DG XIII, Direction B.

Perspectives for Advanced Communications in Europe: PACE '89; PACE '90; and PACE '92, January 1992 - Available on request from the RACE central office, DG XIII, Direction B.

Council Decision 91/352/CEE of 7th June 1991 adopting a Specific Programme of research and technology development in the field of Communications technologies: O.J. No L 192/8, 16.7.91

The report of the information and communications technologies review Board, Chaired by Mr. W. Dekker, June 1992.

Communication from the Commission on "Evaluation of the second Framework Programme for research and technological development (SEC(92)675 Final), July 1992.

Evaluation of the second Framework Programme of RTD: **Report from CREST to the Council**, September 1992. CREST/1212/1/92.

Annex VII

Listing of Projects

1001 DVT:Digital video-tape recording terminal for HDTV
1002 Satellite communications for IBCN
1003 GUIDELINE:AIP and standards for TMN
1004 Electro-luminescent flat-panel display for terminal applications
1005 NEMESYS:Traffic and QOS management for IBCN
1006 AIM: AIP application to IBCN maintenance
1007 ITIS: IBC terminal for interactive services
1008 Silicon-based low-cost passive optical components
1009 ADVANCE: Network and customer administration systems for IBCN
1010 Subscriber coherent Multi-channel system
1011 Business CPN
1012 BLNT: Braodband local network technology
1013 HDTV-Switching
1014 ATMOSPHERIC
1015 Domestic CPN
1016 Test tools and equipment
1017 IOLE: IBC on-line environment
1018 HIVITS: High-quality video-telephone and hihg-definition television system
1019 Polymeric optical switching
1020 All-optical switching and bi-stable devices based on semi-conducting polymers
1021 ARISE: A resuable infrastructure for software engineering
1022 Technology for ATD
1023 BEST: A methodological approach to IBC system requirements specifications
1024 NETMAN: Functional specifications for IBC TNM
1025 Functional specification of security and privacy in IBC
1026 International transmission of digital radio and television
1027 Integrated opto-electronics towards coherent multi-channel IBCN
1028 REVOLVE: Regional evolution planning for IBC
1029 Development of improved InP substrate material for opto-electronic devices
1030 ACCESS: Advanced customer connections, an evolutionary systems strategy
1031 Low-cost opto-electronic components
1032 Development and testing of optical components for subscriber networks
1033 OSCAR: Optical switching systems, components and architecture research
1034 Usability engineering requirement for IBC
1035 Customer premises network (CPN)
1036 WDTM broadband customer premises network
1037 User criteria for the realisation of opportunities afforded by IBC
1038 MCPR: Multi-media communication, processing and representation
1039 DIMUN: Distributed international manufacturing
1040 RIPE: RACE integrity primitives evaluation
1041 FUNCODE: Functional specification of codes
1042 MULTI-MED: Functional service integration in support of professional users
1043 Mobile telecommunications project
1044 IBCN development and implementation strategies

1045 Consensus management project
1046 SPECS: Specification and programming environment for comms software
1047 Techniques and integrity mechanisms in IBCN
1048 RSVP: RACE strategy for verification
1049 ATM concept
1050 IBC applications analysis
1051 Multi-gigabit transmission in IBCN subscriber loops
1052 SPOT: Signal processing for optical and cordless transmission
1053 TERRACE: TMN evolution of reference configurations for RACE
1054 APPSN: Application pilot for people with special needs
1055 MERCHANT: Methods in electronic retail cash handling
1056 BIPED: Basic business IBC demonstrator
1057 AQUA: Advanced quantum-well lasers for multi-gigabit transmission
1058 RESAM: Remote expert support for aircraft maintenance
1059 DIVIDEND: Dealer interactive video
1060 DIDAMES: Distributed industrial design and manufacturing of electronic subassemblies
1061 DIMPE: Distributed integrated multi-media publishing environment
1062 MARIN: Marine industry applications of broadband communications
1063 MAPS: RACE mobile applications pilot scheme
1064 MIOCA: Monolithic integrated optics for customer access applications
1065 ISSUE: IBCN systems and services useability engineering
1066 IPSNI: Integration of people with special needs by IBC
1067 Usability design information support
1068 ROSA: RACE open services architecture
1069 EPLOT: Enhanced performance lasers for optical transmission
1070 Testing Pay-per-view in Europe
1071 Applications analysis
1072 ITACA: IBCN testing architecture for conformance assessment
1073 GEOTEL: Application pilot in the petroleum and chemicals industry
1074 ECHO: Electronic case-handling in offices
1075 Telepublishing
1076 REMUS: Reference models for useability specifications
1077 Usage reference model for IBC
1078 European museums network
1079 CAR: CAD/CAM for the automotive industry in Europe
1080 HDTV experimental usage
1081 BUNI demonstrator
1082 QOSMIC: QOS verification methodology and tools for integrated communications
1083 PARASOL: ATM specific measurement equipment
1084 MIME: Development of emulators and simulators
1085 TET-ADAPT: Adaptation of techno-economic evaluation tools for RACE
1086 TELEMED
1087 PROVE: Provision of verification
1088 TUDOR: Usability issue for people with special needs
1089 LOOP: Low-cost optical components
1091 ESP: EBIT service project
1092 DIRAC: Database for reliability calculations

Annex VIII

Organisations involved in RACE Projects

ANNEX B - Alphabetical List of Participating Organisations

	Organisation	Country	Project(s)
01-PLIRO	01-PLIROFORIKI	GR	R1075
AAS/TAU	Austrian Academy of Sciences Technology Assessment Unit	A	R1037
ACEC	ACEC SA	B	R1018, 22, 41
AEG	AEG Aktiengesellschaft	D	R1018, 39
AEG	AEG Forschungsinstitut	D	R1041
AEG	AEG Kabel AG	D	R1030, 44, 56
AEG	AEG Olympia AG	D	R1063
AET	Applicazioni Elettrotelefoniche A.E.T. Spa	I	R1044
AIB	Allied Irish Bank Plc	IRL	R1059
AKZO	AKZO International Research BV	NL	R1019*
ALCASP	Alcatel Espace SA	F	R1002*, 86
ALGO	Algotech Sistemi	I	R1076*
ALPHA	ALPHA SAI	GR	R1016, 84
AMPER	Amper SA	E	R1044, 45, 81
ANALYSIS	Analysis Ltd	UK	R1028
ANDUS	ANDUS GmbH	D	R1060
ANITRA	Anitra Medienprojekte	D	R1070*
ANT	ANT Nachrichtentechnik GmbH	D	R1002, 30, 31, 44, 47*, 51
APD	Grupo de Empresas A.P.D.	E	R1042
APM	Architecture Projects Management	UK	R1068
APSIS	APSIS	F	R1042
APT	AT&T en Philips Telecommunicatie Bedrijven BV	NL	R1022, 31, 33, 44, 51, 81, 83
ASCOM	Ascom Tech AG	CH	R1053, 83, 87
AT&T NSI	AT&T Network Systems International BV	NL	R1045, 77
ATEA	ATEA	B	R1044
ATR	ALCATEL Radiotelephone	F	R1043
AXI	AXION A/S	DK	R1009
B&S	Barr & Stroud Ltd (Pilkington)	UK	R1019
B3i	Bureau International d'Ingénierie Informatique	F	R1083
BALT	Baltimore Technologies (Subcontractor)	IRL	R1021
BARCO	Barco Industries N.V.	B	R1044
BED	BED	D	R1015
BBC	British Broadcasting Corporation	UK	R1018, 36*,43, 63, 77, 81
BC	Bertin & Cie.	F	R1092
BCOM	Broadcom Eireann Research Ltd	IRL	R1003, 09*, 21*, 23, 24*, 28, 53, 91
BELSER	Belser Verlag	D	R1078
BIBA	Bremer Institut für Betriebstechnik und angewandte Arbeitswissenschaft an der Universität Bremen	D	R1039*, 62, 85
BICC	BICC Cables Plc	UK	R1032*, 39, 60
BNP	Banque Nationale de Paris	F	R1059
BOSCH	Robert Bosch GmbH	D	R1043, 44, 54

BT	British Telecommunications Plc	UK	R1003*, 06, 09, 18, 22, 23, 24, 25, 28, 30, 32, 33, 34, 37*, 41, 43, 44, 45, 48, 55, 59, 67, 68*, 77, 79, 81*, 87, 91, 92*
BT/NoI	British Telecommunications Plc (Northern Ireland)	UK	R1028
BT/NoS	British Telecommunications Plc (North of Scotland District)	UK	R1028
BTM	Alcatel/BTM	B	R1002, 22*, 44, 45, 46, 83
BTS	Broadcast Television Systems GmbH	D	R1080
BURDA	Burda GmbH	D	R1061
CAP	CAP SESA Régions	F	R1087
CAP	CAP Sesa Telecom	F	R1021
CAP	CAP SOGETI Innovation	F	R1016, 17
CASE	Case Communications Ltd	UK	R1003, 05*, 53, 79, 82
CCETT	Centre Commun d'Etudes de Télédiffusion et Télécommunications	F	R1018
CEA	Commissariat à l'Energie Atomique	F	R1008
CEL	Crosfield Electronics	UK	R1061
CERDA	Institut Cerda	E	R1037, 71
CET	(Centro de Estudos de Telecommunicações) Correios & Telecomunicações de Portugal	P	R1009, 21, 23, 24, 28*, 54,
CIRU	Computer Industry Research Unit	UK	R1055, 59
CIT	Alcatel CIT SA	F	R1022, 44, 45
CLEM	Clemessy SA	F	R1016, 82, 87
CNET	Etat Français - Ministère des PTT Centre National d'Etudes des Télécommunications	F	R1015, 18, 22, 27, 30, 32, 5, 41, 44, 46, 48, 57, 68, 3, 87, 92
CNR	Consiglio Nazionale Delle Ricerche	I	R1066*
CNRG	Communication Networks Research Group	GR	R1083
CNUSC	C.N.U.S.C.	F	R1086
CONTEL	Contel IPC (UK) Ltd	UK	R1059
CORNEL	Cornelsen Verlag	D	R1075
COSI	Consorzio per l'OSI in Italia	I	R1044, 72*
CPR	Consorzio Pisa Ricerche	I	R1091
CPS	Condatec Projekt Software GmbH	D	R1075
CSATA	CSATA - Tecnopolis (Centro Studi e Applicazioni in Tecnologie Avanzate)	I	R1028, 38, 92
CSELT	C.S.E.L.T. - Centro Studi e Laboratori Telecomunicazioni Spa	I	R1018, 27, 44, 46, 48, 53*, 54, 57, 68
CT	Compagnie Technicon	F	R1042
CTE	Centro de Textos Electronico SA	E	R1061
CTT	Correios e Telecomunicações de Portugal	P	R1022, 91
CU	Commercial Union Assurance Company	UK	R1074
CWI	Stichting Mathematisch Centrum - CWI	NL	R1040*
DANAOS	Danaos Shipping Co.	GR	R1062

DANET	DANET GmbH	D	R1006
DBP	Bundesministerium für das Post und Fermeldewesen	D	R1045
DBP	Deutsche Bundespost	D	R1051, 92
DEA	Danish Engineering Academy	DK	R1092
DETECON	DETECON GmbH	D	R1075*, 86*, 91*
DEUTSCH	Compagnie Deutsch	F	R1031
DHL	DHL Worldwide Express	B	R1063*
DHZ	Deutches Herzentrum	D	R1086
DIT/UPM	Departamento de Ingenieria Telemática Universidad Politecnica de Madrid	E	R1072
DLV	Delta Lloyd Verz.	NL	R1074
DORNIER	Dornier System GmbH	D	R1002
DTB	Deutsche Thomson-Brandt GmbH	D	R1001, 18
EBT	EB Teknologi Ltd	N	R1039, 43, 46
EBU	Technical Centre of the EBU	B	R1026*
ELBASA	ELBASA	E	R1060
ELCENT	ElektronikCentralen	DK	R1016, 84, 87
ELCOMA	Philips International BV. Elcoma Division	NL	R1022
ELEC	Electricity Council	UK	R1063
ELIN	Alcatel Austria Elin Forschungcentrum GmbH	A	R1046
ELSYP	ELSYP	GR	R1075
EMI	EMI Electromagnetics Institute	DK	R1014
EMP	Empirica GmbH	D	R1054
ENI	Enichem Synthesis Spa	I	R1020
EOLAS	The Irish Science and Technology Agency	IRL	R1087
EPFL	EFPL	CH	R1057
ERA	ERA Technology Ltd	UK	R1020
ERC	Alcatel Austria - ELIN Research Center	A	R1017
ERICSSON	Ericsson Radio Systems AB	S	R1043
ERICSSON	Ericsson Telecom	S	R1056*, 68, 81
ESTTO	ESTTO SA	GR	R1061
FACE	Industrie FACE Standard Spa	I	R1002, 06, 08, 13, 17, 22, 38, 44, 45, 66
FATME	Fabbrica Apparecchiature Telefoniche e Materiale Elettrico - Brevetti Ericsson	I	R1011*, 15, 35*, 44, 45, 56, 72, 81
FCR	France Cable & Radio	F	R1059, 87
FCRE	F.C.R. Entreprises	F	R1091
FI/DBP	Forschungsinstitut der DBP TELEKOM beim Fernmeldetechnischen Zentralamt	D	R1018, 22, 25*, 32, 41
FIAR	Fabricca Italiana Apparecchiature, Radioelettriche SpA	I	R1009
FINTEL	Post and Telecommunications of Finland	SF	R1039, 44
FIT	Swiss Federal Institute of Technology, Zurich	CH	R1033

FHG	Fraunhofer Abbeitsgruppe für Graphische Datenverarbeitung	D	R1079
FLZ	Fischer-Madsen & Lorenz Petersen Data Communications Consultants A/S (Fischer and Lorenz)	DK	R1005
FMH	Universidade Tecnica de Lisboa, Faculdade de Motricidade Humana, Departamento de Educaçao Especial e Reabilitaçao, (FMH-DEER)	P	R1054, 88
FOKKER	Fokker Aircraft BV	NL	R1058
FORD	User 2 - Ford (Europe)		R1079
FORTH	Foundation for Research and Technology - Hellas	GR	R1005, 66
FTZ	Deutsche Bundespost TELEKOM - Fernmeldetechnisches Zentralamt	D	R1044, 48, 53, 87
FUB	Fondazione Ugo Bordoni	I	R1043, 65, 68, 72
GEC	GEC-Marconi Research Ltd.	UK	R1043, 92
GEC	GEC Research Ltd (Subcontractor)	UK	R1011
GEC	The General Electric Company Plc (GEC Research Ltd, Marconi Research Centre)	UK	R1002
GEC	The General Electric Company Plc	UK	R1014, 18, 24, 30, 33, 35, 36
GEOSTOCK	Société Francaise de Stockage Géologique	F	R1073*
GMD	Gesellschaft für Mathematik & Datenv.	D	R1068, 72, 75
GPT	GEC-Plessey Telecommunications Ltd.	UK	R1005, 44, 45, 46, 51 56, 81
GRUNDIG	Grundig AG	D	R1001
HAI	Hellenic Aerospace Industry	GR	R1044
HAMBURG	Museum Hamburg	D	R1078
HASLER	Research & New Technologies Division of Ascom Holding Ltd (Hasler AG)	CH	R1016, 33
HELL	Dr. Ing. Rudolf Hell GmbH	D	R1061
HHI	Heinrich Hertz Institut	D	R1010
HIDB	Highlands & Islands Development Board	UK	R1028
HP	Hewlett-Packard Ltd	UK	R1016, 83
HUSAT	Husat	UK	R1063, 65*, 76, 79
HUT	Helsinki University of Technology	SF	R1039, 62
IAD	International Automotive Design	UK	R1079*
IBM	IBM France SA	F	R1005, 46, 53, 68, 79, 82*, 84
ICOM	International Council of Museums	F	R1078
ICOM	Intracom SA	GR	R1009, 21, 24
IDATE	IDATE	F	R1050, 71, 77, 86
IFC	IFC Research Ltd	UK	R1050*, 71*, 77
IMEC	Inter-universitair Mikro-electronika Centrum vzw	B	R1010, 19, 22, 33, 69
IMS	Irish Medical Systems	IRL	R1086
INESC	Instituto de Engenharia de Sistemas e Computadores	P	R1011, 22, 46
INET	I-NET Limited	UK	R1053

INMARSAT	Inmarsat	UK	R1062
INST	Instruments SA	F	R1032, 36
INSTM	Institut Montpellier	F	R1086
INTECS	INTECS Sistemi Spa	I	R1017, 21
INTELSA	Industrias de Telecomunicacion SA	E	R1023, 44, 48
INTERCAI	INTERCAI	NL	R1070
INTRACOM	Intracom SA	GR	R1053, 60, 61
IPSYS	IPSYS Plc	UK	R1021
IROE	Instituto di Recerca sulle Onde - Electromagnetiche del Consiglio Nazionale dell Recerche	I	R1020
IRR	Institute for Rehabilitation Research	NL	R1066
ISI	ISI-Fraunhofer GmbH	D	R1050, 71, 75, 78*
ISL	Institut für Seeverkehrswirtschaft und Logistik	D	R1062
ISOFT	Intrasoft (Subcontractor)	GR	R1009, 21
ISR	Alcatel/ISR	F	R1053, 55, 60, 63
IST	Instituto Superior Tecnico	P	R1051
ITALTEL	Societa Italiana di Telecomunicazioni SpA	I	R1012, 44, 45, 49, 81
ITEC	Reading ITEC (Information Technology Centre)	UK	R1066
JTAS	Jutland Telephone Aktieselskab	DK	R1022, 44, 72, 81
KME	Kabelmetal Electro GmbH	D	R1032, 44, 89
KONE	Kone Belgium SA	B	R1039
KTAS	Kjobenhavns Telefon Aktieselskab	DK	R1005, 09, 22, 44, 53, 58, 82, 83, 84, 91
KUL	Katholieke Universiteit Leuven	B	R1066
L-CUBE	L-CUBE Information Systems SA	GR	R1061
LABEIN	Labein	E	R1072
LC	Lohja Corporation Electronic Industries	SF	R1004*
LDM	Laboratoires de Marcoussis	F	R1006, 19, 27, 46, 57
LEP	Philips - LEP (Laboratoires d'Electronique Philips)	F	R1010, 18, 33*
LER	Thomson-CSF	F	R1080*
LME	L.M.Ericsson Ireland	IRL	R1009
LME	Telefonaktiebolaget L M Ericsson	S	R1014, 21, 30, 33
LOEWE	Loewe Opta GmbH	D	R1007*
LOHJA	Lohja Corporation	SF	R1081
LUT	Loughborough University of Technology Dept of Electronic & Electrical Engineering	UK	R1042
LWB	Lloyd Werft Bremerhaven GmbH	D	R1062*
MARCONI	Marconi Italiana Spa	I	R1044
MARI	MARI Advanced Microelectronics Ltd	UK	R1007, 09, 21, 23*, 81
MATRA	MATRA Communication	F	R1004, 07, 18, 41, 81
MATRA	SA Matra-Space	F	R1014
MBLE	MBLE N.V./ S.A.	B	R1022
MCC	Maxwell Communication Corporation Plc	UK	R1061*

MCS	(Marconi Communication Systems) The Marconi Company Limited	UK	R1002
MCP	MCP Wafer technology	UK	R1029*
MECF	Medical Computers France	F	R1042
MET	Matra-Ericsson Télécommunications	F	R1014*, 44, 56, 83
METATYPE	Metatype SA	GR	R1061
MM	Midland Montagu	UK	R1059
MONOTYPE	Monotype Corporation Plc	UK	R1061
MSS	Marconi Space Systems The Marconi Company Limited	UK	R1002
NAH	Nassauisches Heim	D	R1054
NAVICON	Navicon SA	E	R1062
NCC	National Computing Centre Ltd.	UK	R1048
NCI	Norcontel (Ireland) Ltd	IRL	R1059
NEDPTT	Centraaldirectie Nederlandse PTT	NL	R1088
NEWPOL	Newcastle Polytechnic	UK	R1088
NIHE	The National Institute for Higher Education	IRL	R1046
NKT	Aktieselskabet Nordiske Kabel & Traadfabriker Denmark	DK	R1014, 30*, 45, 51, 56
NMRC	National Microelectronics Research Centre	IRL	R1020, 43
NOKIA	NOKIA Corporation	SF	R1011, 22, 35, 43, 44
NSDD	Telecom Eireann NSDD	IRL	R1059
NTA	Norwegian Telecommunications Administration	N	R1022, 44, 53, 68, 83, 86, 91
NTA	Research Department (Teledirektorat) of Norwegian Telecommunications Administration	N	R1023
NTE	NTE GmbH	D	R1075
NTUA	National Technical University of Athens	GR	R1014, 22, 24, 62
NTUA	National Technical University of Athens (Subcontractor)	GR	R1009
ORT	Offset Repro Technik	D	R1075
OTE	Hellenic Telecommunications	GR	R1028, 43
OTTO	Otto Versand	D	R1075
OXC	Oxford Consultants (Europe)	UK	R1042
OXP	Oxford Polytechnic Dept of Computing And Mathematical Science	UK	R1042
PEUSA	Peugeot SA	F	R1079
PHILIPS	Nederlandse Philips Bedrijven BV	NL	R1001, 10*, 31, 64, 69, 80
PHILIPS	Philips SA	B	R1022
PHILIPS	Philips Telecommunicatie en Data Systemen, Nederland BV	NL	R1022, 45
PHILIPS	Philips USFA	NL	R1040, 47
PHILIPS	Philips International BV	NL	R1074*
PKB	PK Berlin	D	R1078
PKI	Philips Kommunikations Industrie AG	D	R1015, 18, 22, 35, 41, 43, 44, 58, 74, 78, 83
PLANET	Planet SA	GR	R1061, 73
PLES	Plessey Research, Roke Manor Ltd	UK	R1009, 11, 12*, 15, 35, 49*

PLES	Plessey Research (Caswell) Ltd	UK	R1010, 18, 64, 69*
PLESSEY	Plessey UK Ltd	UK	R1043, 67, 68
PRC	Philips Radio Communication Systems Ltd	UK	R1043*, 63
PRENSA	PRENSA	E	R1075
PROMAR	Proyectos Marinos	E	R1062
PRL	Philips Research Labs	UK	R1043
PTT	Swiss PTT	CH	R1045, 86
PUM	Philips Universitaet Marburg	D	R1057
QMC	QMC Instruments Ltd	UK	R106
QMC	Queen Mary College, London	UK	R1022
QMW	Queen Mary & Westfield College (University of London)	UK	R1083
RADI	Radiall SA	F	R1032, 89*
RAL	Rutherford Appleton Laboratory of the Science and Engineering Research Council	UK	R1042
REFER	Refer BVBA	B	R1076, 87
RIC	RIC Association Internationale	B	R1044*, 45*
RKL	Regio Kabel Limbourg	NL	R1070
RNL	Research Neher Laboratories of the Netherlands PTT	NL	R1015, 18, 19, 22, 25, 33 35, 36, 40, 41, 43, 44, 46, 48, 54, 65, 68, 81, 91
RTC	RTC-Compelec	F	R1031
RTT	Régie T.T.	B	R1022, 44, 45
SACM	SACM	F	R1062
SAGEM	Sagem Sa	F	R1047
SAIT	SAIT S.A. (Subcontractor)	B	R1041
SARDE	Sarde S.A.	F	R1073
SARIN	Sarin	I	R1065
SAS	SAS Denmark	DK	R1058*
SAT	Société Anonyme de Télécommunications	F	R1030, 44, 45, 56
SEB	S-E-Banken, SEB Data	S	R1059
SEC	SOURIAU & Cie.	F	R1089
SEL	Alcatel/SEL AG	D	R1003, 06*, 13*, 15, 16*, 17*, 22, 31*, 32, 33, 34*, 35, 38*, 44, 45, 51*, 53, 54*, 57*, 60, 67*, 77*, 81, 83, 86, 87, 88*
SEPT	Service d'Etudes communes des Postes et Télécommunications	F	R1025
SES	Scitex Europe Sa	B	R1061
SESA	Alcatel/SESA	E	R1002, 06, 11, 17, 18, 22, 35, 36, 38, 43, 44, 46, 48, 56
SFI	Senter for Industrieforskning	N	R1039
SGS	SGS Microelletronica SpA	I	R1004, 14, 44
SGS	SGS-Thomson Microelectronics SA	F	R1030, 36
SIBS	Sociedade Interbancaria de Servicos	P	R1055
SID	Synergie Informatique et Developpement	F	R1068
SIE	Sistemas Expertos	E	R1042,

SIEMENS	Siemens AG	D	R1010, 12, 31, 40, 44, 45, 47, 49, 53, 64*, 69, 81, 83, 92
SIETEC	SIETEC	D	R1075
SIETTE	SIETTE	I	R1086
SIGOS	SIGOS	D	R1074
SINTRA	Thomson - SINTRA	F	R1033
SIP	Società Italiana per le Telecomunicazioni	I	R1053
SIRTI	SIRTI SpA	I	R1032, 89
SIXCOM	Sixcom (Olivetti Group)	I	R1055
SLIGOS	Sligos	F	R1055*
SNS	Sloman Neptun Schiffahrts AG	D	R1062
SOFREC	SOFRECOM	F	R1070
SOGITEC	SOGITEC	F	R1075
SOPHA	Sopha Medical	F	R1042
SOURIAU	Souriau et Cie.	F	R1030
SPAG	SPAG Services S.A.	B	R1048*, 87*
SPECTRUM	Spectrum Energy & Information Technology Ltd	UK	R1073
STAL	Televerket (Swedish Telecommunications Administration)	S	R1009, 11, 14, 18, 21, 23, 24, 25, 30, 33, 35, 41*, 43, 44, 45, 53, 56, 59, 67, 83, 86, 87
STAT	STAT SA	GR	R1075
STC	Alcatel STC Plc	UK	R1014, 22, 24, 27*, 31, 36, 44, 45, 53, 56, 57, 59*, 68, 83, 86, 89
STK	Alcatel/STK	N	R1022, 38, 86
STL	STC Technology Ltd	UK	R1036
STL	STC Plc, STC Technology Ltd	UK	R1008*
STOLL	Stollmann GmbH	D	R1060
SUS	SUS Research Ltd	IRL	R1028
SWIFT	S.W.I.F.T.	B	R1055
SWIN	(Swedish Institute for the Handicapped	S	R1088
SYD	Synergie Informatique et Developpement	F	R1009
T&T	Thrane & Thrane	DK	R1062
TCD	University of Dublin, Trinity College	IRL	R1009, 20*
TCE	Thomson Consumer Electronics	F	R1080
TCSF	Thomson-CSF	F	R1015*, 18*, 29, 33, 35, 36, 47, 57, 81
TECHNI	Technisystems	GR	R1062
TECHNO	TechnoPlan	D	R1060
TECSI	GSI-Tecsi SA	F	R1005, 46*, 59, 82, 84
TEE	Telecom Eireann (Subcontractor)	IRL	R1020
TEKNON	Teknon Gesellschaft für Wissenbasierte Systeme GmbH	D	R1017
TELE-S	Telematic Services GmbH	D	R1060*

TELEFON	Telefónica de España SA	E	R1014, 18, 22, 24, 27, 28, 30, 41, 44, 48, 51, 53, 55, 72,
TELENORMA	Telefonbau & Normalzeit GmbH	D	R1011, 35, 38, 44, 45, 56
TELES	Télésystèmes SA	F	R1061, 65, 73, 74, 77, 86
TELETTRA	Telefónica Elettronica e Radio Spa	I	R1027, 44
TELINDUS	Telindus N.V.	B	R1044
TELSI	Telefónica Sistemas	E	R1009, 42*, 78, 86, 91
TELSPACE	Telspace S.A.	F	R1002
TESA	Telettra Espanola S.A.	E	R1043, 44, 45, 81
TFL	Teleteknisk Forskningslaboratorium	DK	R1046, 68
THEM	Thomson Hybrides et Microondes SA	F	R1029, 30, 43
THOMSON	Thomson SA	F	R1044, 45
THORN	Thorn EMI Central Research Labs	UK	R1015, 43
TITN	T.I.T.N.	F	R1044, 61
TL	TeleLOGIC AB	S	R1021, 24
TLP	Telefones de Lisboa e Porto	P	R1053, 78
TNC	The Networking Centre Ltd	UK	R1083
TRCF	Technical Research Centre of Finland	SF	R1008, ,42, 54, 65, 66
TRICOM	Konsortium TRICOM	CH	R1022, 44
TRT	Telecommunications Radioélectriques et Téléphoniques	F	R1018, 22, 43, 63
TST	Telefunken System Technik and Logistics	D	R1062
TUB	Technische Universität Berlin	D	R1075
TUD	Technical University of Denmark	DK	R1013, 27
TVE	Thomson Video Equipment	F	R1080
UCL	University College London	UK	R1005, 54, 67, 79
UCW	University College of Wales (Subcontractor)	UK	R1021
UDOR	Universitat Dortmund	D	R1033
UNIBIT	UNIBIT (Holdings)	UK	R1006
UOA	University of Athens	GR	R1027, 51
UOA	University of Aveiro	P	R1052*
UOB	University of Bremen	D	R1062
UOC	University of Cambridge	UK	R1042
UOD	University of Dundee	UK	R1066
UOF	University of Florence	I	R1086
UOG	University of Ghent	B	R1004
UOH	University of Heidelberg	D	R1086
UOL	University of London	UK	R1086
UOM	University of Manchester	UK	R1088
UOMU	University of Mulhouse	F	R1087
UOS	University of Strathclyde	UK	R1043
UOS	University of Stuttgart	D	R1022, 57
UPM	Fundaciòn General de la Universidad Politècnica de Madrid	E	R1023
UPMC	DNAC - Université Pierre et Marie Curie	F	R1009
UST	Stirling University	UK	R106[illegible]

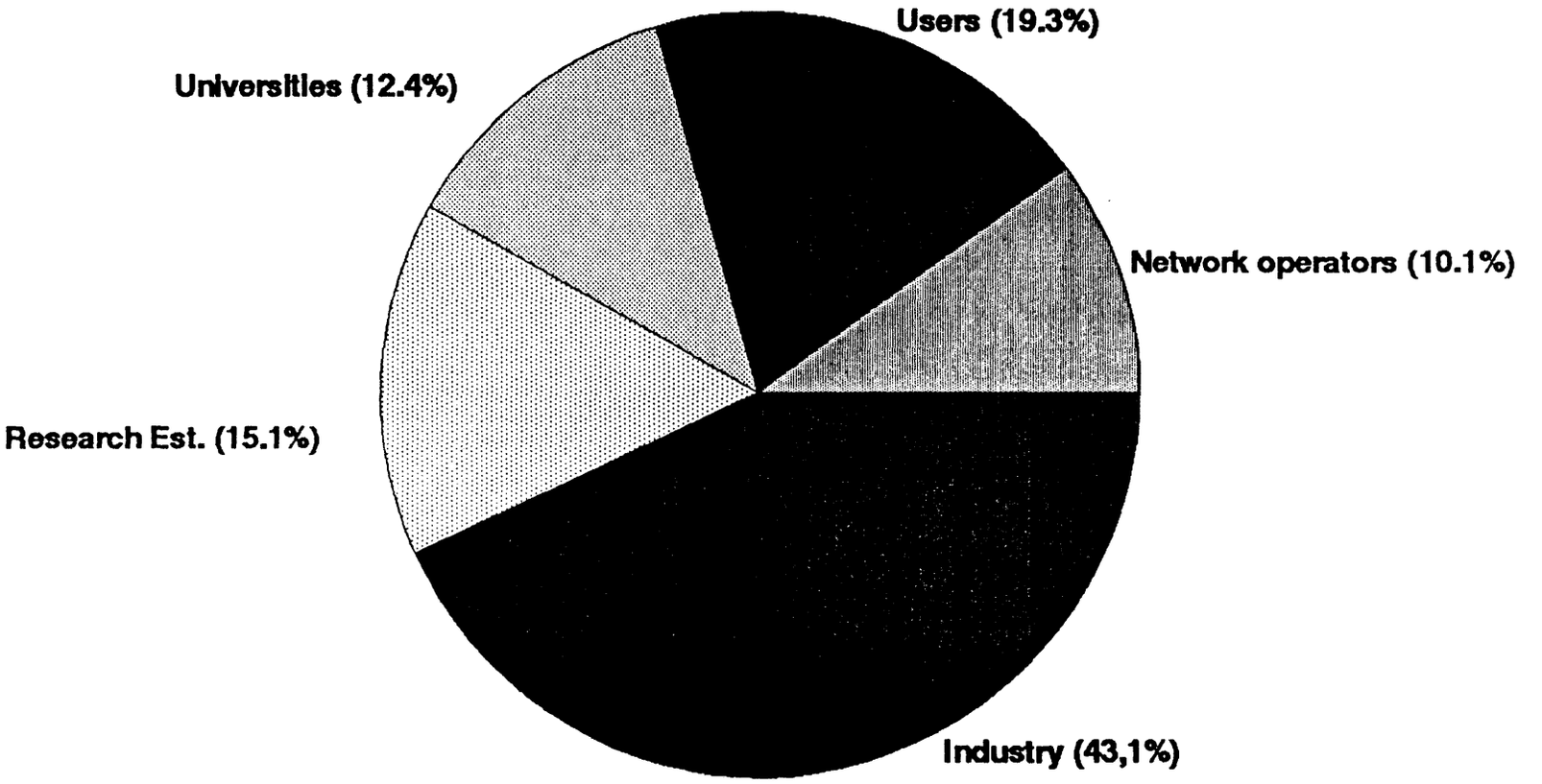
USTL	Université de Sciences et Techniques du Languedoc	F	R1029
UVA	University of Aarhus	DK	R1040
UVD	University of Durham	UK	R1084
UVL	University of Leuven	B	R1040
UVS	University of Surrey	UK	R1023
VERITAS	Det Norske Veritas	N	R1062
VITEC	VITEC	F	R1079
W&G	Wandel & Goltermann GmbH & Co	D	R1083*
WRC	Work Research Center Ltd	IRL	R1034, 77
WSD	Wärtsilä Diesel	SF	R1062
ZMF	ZMF	D	R1078

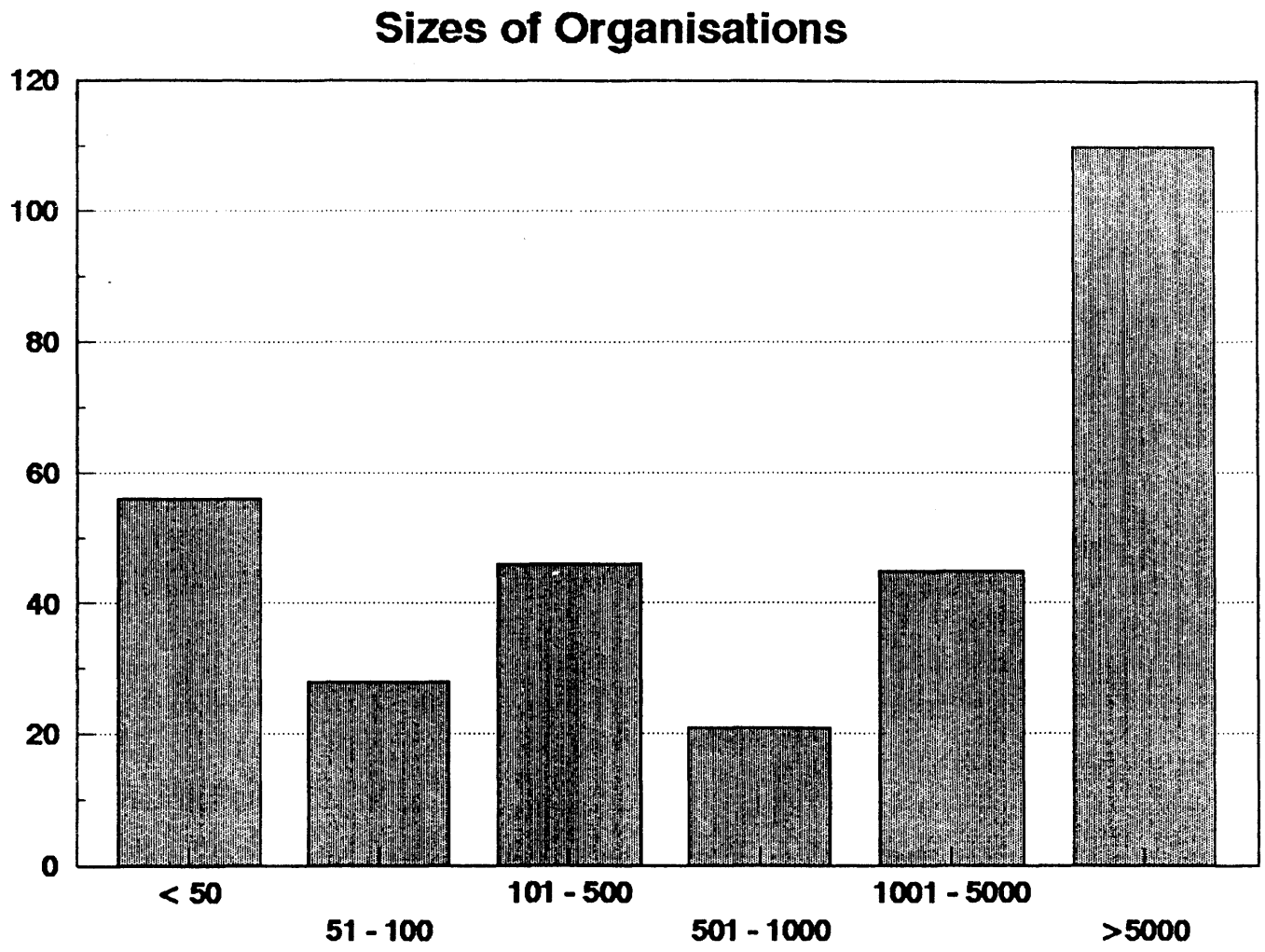
*** Prime Contractor for Project**

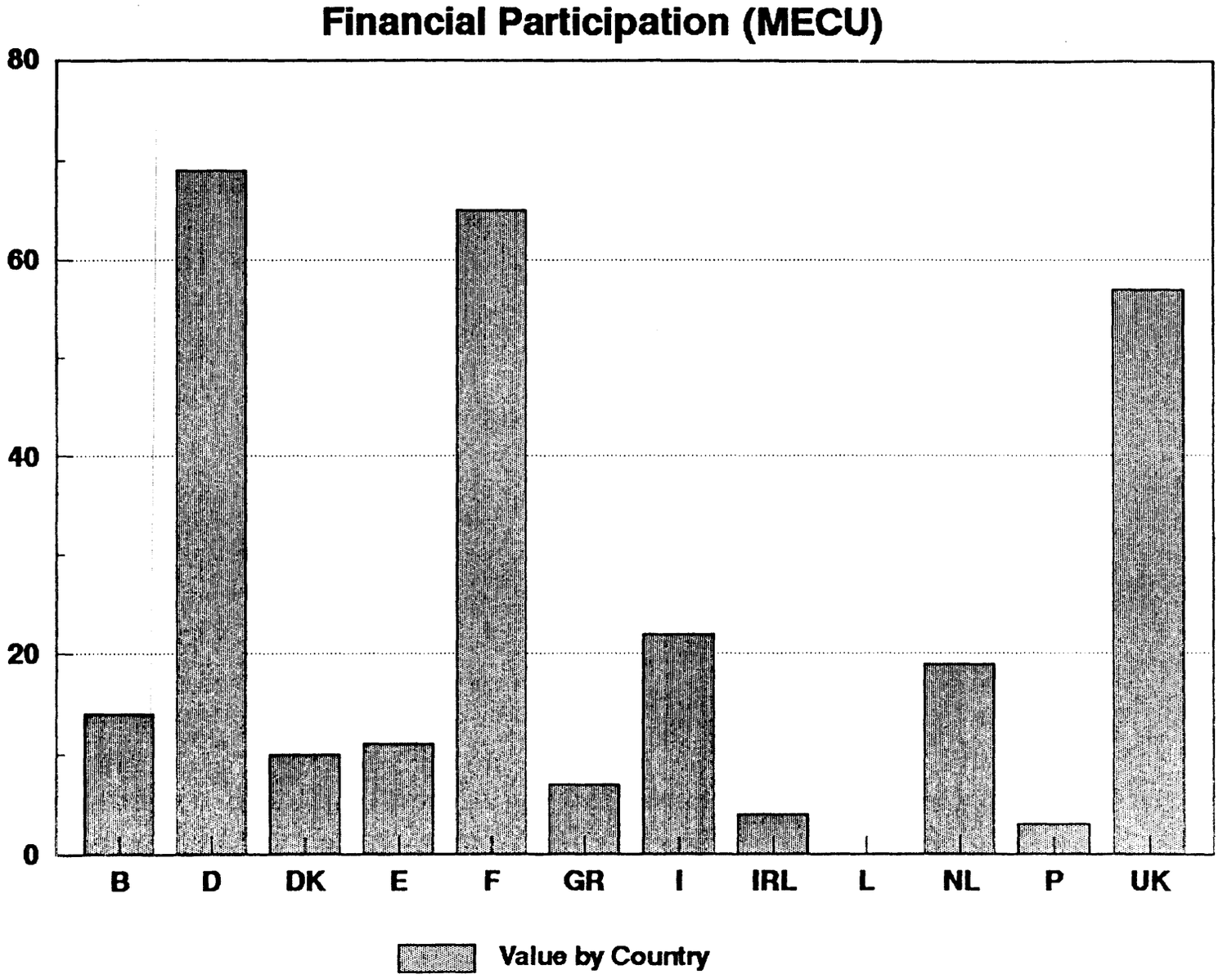
Annex IX

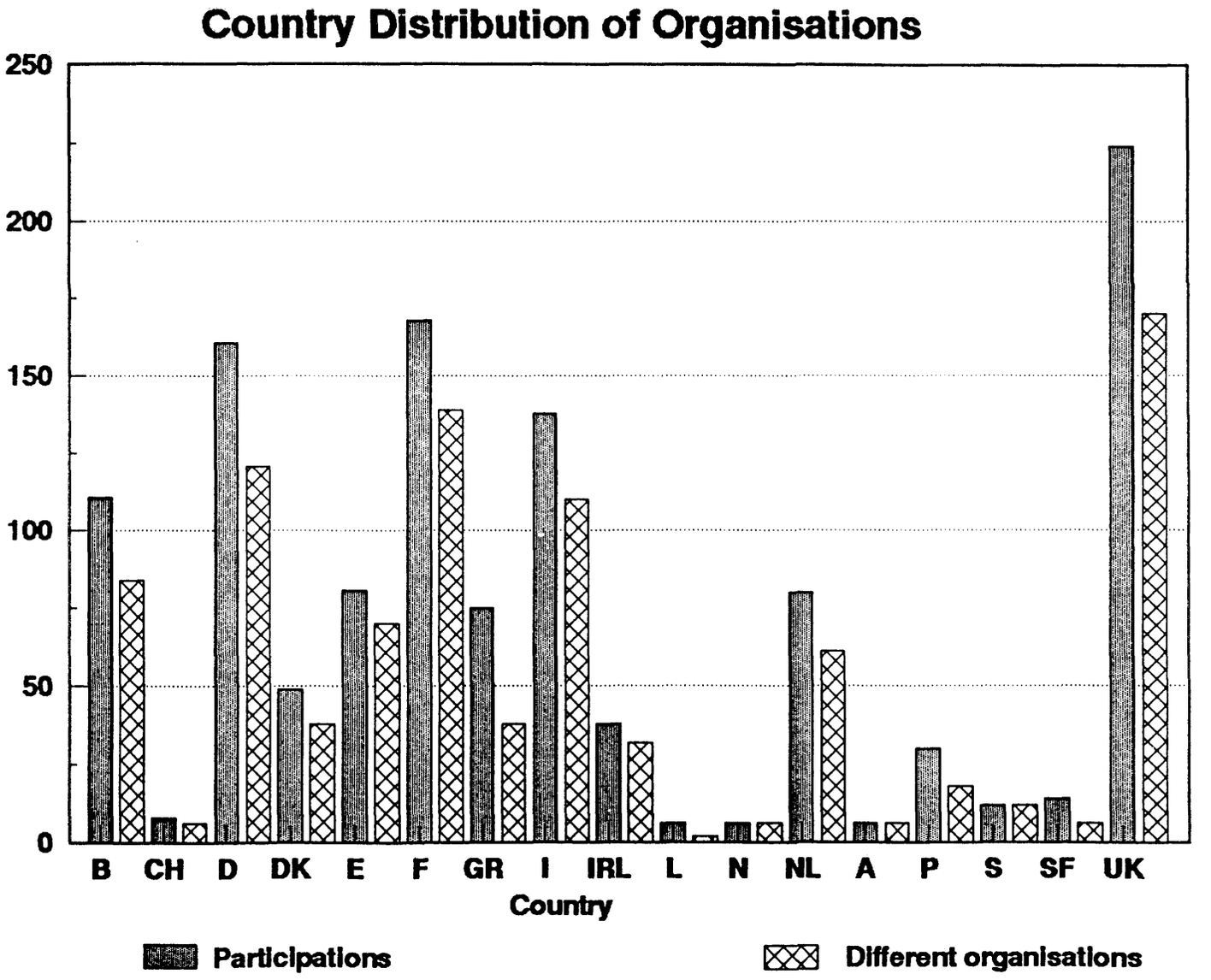
Financial and participation statistics

Types of Organisations




Sizes of Organisations
120
100
80
60
40
20
0
< 50
51 - 100
101 - 500
501 - 1000
1001 - 5000
>5000


Financial Participation (MECU)
80
60
40
20
0
B
D
DK
E
F
GR
I
IRL
L
NL
P
UK
Value by Country


Country Distribution of Organisations
250
200
150
100
50
0
B
CH
D
DK
E
F
GR
I
IRL
L
N
NL
A
P
S
SF
UK
Country
Participations
Different organisations

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