Multi Service Access Everywhere

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Overview

> Introduction – MUSE
> Optical access in MUSE
> Access Network Architecture
> Summary
Low cost, multi service access and edge network for ubiquitous delivery of broadband services to all Europeans.
34 partners - 110 PY/year
Start: Jan 2004

Phase I: 2004-2005
Phase II: 2006-2007

Consortium

System vendors
ALCATEL
ERICSSON
Lucent Technologies
Bell Labs Innovations
SIEMENS
THOMSON

Component vendors
Infineon Technologies
STI

Operators
Telefonica

Research Inst. & Universities
IMEC
Inria
Budapest University (BUTE)
ICCS/NTUA
HHI
Lund Institute of Technology (LTH)
TU Eindhoven
ACREO
Univ. Carlos III de Madrid
University of Essex

SME
Aarhus BB society
Robotiker

www.ist-muse.org
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Compact CO solution for PTP

- Two Bidirectional ports within SFF sized housing
- Prototype realised based on TO BIDI® units from Infineon / EZconn
- Reduced density - comparable to DSL line cards

ACREO, Infineon/EZconn, Ericsson
Asymmetric PON Access Multiplexer miniaturization

> **Downstream: PON**
  • Downlink: 80% Power and Footprint reduction!

> **Upstream: P2P**
  • Standard 1000Base LX, Synchronous, no BMR
  • Multifibre array Rx
The Down-Link:
- Low cost generation of radiowave (> 10 GHz) by optical frequency multiplication
- Downstream experiment over 4 km MMF (cf. We4.P090) (upstream on-going)

WIMAX over Fibre

TU Eindhoven
DSL over Fibre

- Lower power consumption at the cabinet
- Smaller cabinet size
   => lower operational cost
- Tested VDSL2 (100 Mbit/s) over 45 km fibre (cf. Mo.4.3.6)
CWDM dual-stage access ring

> Lower cost WDM optics
> Allows to integrate different optical access technologies on same fibre
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Multi service access

> Evolution to Ethernet in access: confirmed trend
> How to achieve a multi-service access network?
  • Multi provider capable
  • End-to-End QoS
  • Scalable solution for secure connectivity

Aim: architecture studies L1 agnostic
However: specific considerations for first mile
Multi-provider capable access network

User  NAP  RNP

Customer Premise Networks  First Mile  Aggregation Networks  Regional Network  Service Network

Connectivity Provider  Packager  Service Providers

NSP  ASP  ISP
QoS control

> QoS is key in multi-service access

> End-to-End QoS solutions (e.g. IntServ)
  • commercially failed because of complexity

> Priority based QoS (e.g. Diffserv)
  • works in over-provisioned Core Networks,
  • insufficient for Access & Aggregation

=> Simplified QoS control in Access & Aggregation needed
QoS control

> Pre-provisioned pipes

> Network Resource Controller (NRC)
  - View of flows and BW already allocated
  - Admission control after request
  - Configures policers at borders
Secure connectivity

> Ethernet assumes a trusted LAN environment
  - Ethernet MAC@ can be configured by user
    - Spoofing, conflicts
  - Broadcast of some initialisation messages (ARP, DHCP, PPPoE)
    - DOS attacks
    - Confidential info to users or competing providers

> Secure connectivity approaches
  - Anti-spoofing tables
  - Model 1 (L2)
    - Cross-ConnectVLAN
    - Bridging Ethernet MAC@
  - Model 2 (L3)
    - IPv4/IPv6 forwarding
Model 1: L2 Ethernet forwarding

Cross connect VLAN (stacking) or Bridging Ethernet MAC@
Subproject C Demonstrator

xSPs / services
- VoIP
- TVoIP
- Internet

Core network
- SUN Ultra 10 switch
- FE
- GE
- PE1
- PE2

Access node
- aggregation switch

Edge node

Photo Set-up at TNO labs

Ericsson, TNO, ACREO, Infineon, Robotiker, BUTE
Model 2: L3 IP forwarding

IP termination

IP aware bridging (IPv4/IPv6)

BRAS or Edge Router

Ethernet aggregation network

IP termination

routed (IPv4/IPv6)

bridged

IP termination

IPv4/IPv6
Subproject B Demonstrator

Migration: ATM or Ethernet in first mile

- Home Gateway
- Access Multiplexer
- Head-end multicast TV
- Packet-Packet Gateway

- Reference point
- Network i’face
- ADSL f’ties
- Intelligent Node f’ties
- G-OLT
- Aggregation Network
- GW f’ties
- Ethernet or IP forwarding
- Embedded service enablers

Key Partners:
- Alcatel, Thomson, IMEC/IBBT, NTUA, INRIA
- Deutsche Telekom, Telefonica

Migration: ATM or Ethernet in first mile
> Dissemination of architecture to various forums and bodies
> Essential to success of Multi Service Access Everywhere
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Integrated project approach to achieve *Multi Service Access Everywhere*

- Lower cost, higher BW first mile solutions
- Definition of E2E architecture in overall task forces
  - Open architecture for multi provider hosting
  - Network resource control for QoS
  - 2 network models for secure connectivity
- Detailed solutions and demonstrators in subprojects
Thank you