End-to-end Resource Allocation in a Multi Access Network

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MUSE Sub Project C: Fixed Mobile Convergence

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Agenda

• Motivation
• DSL QoS & Ethernet Service Provisioning
• CPM Architecture and Tools Overview
• QoS-related DSL parameters
• Reference Network and RM Interactions
• Simplified Resource Manager Workflow
• Conclusions
• Further Details
Motivation

• Broadband Access Networks: variety of access technologies and transport protocols

• Quality of Service (QoS) provisioning:
  • Protocol diversity: internetworking protocols.
  • Access technology diversity: gathering diagnostic information of each specific access technology. Centralized information handling into an automated Operational Support System (OSS) (ease of access network resources management)

→ Appropriate framework for QoS control based on end-to-end resource allocation for the BB Access Network!
DSL QoS & Ethernet Service Provisioning

QoS in DSL

L2 Features
- ATM CoS
  - CBR (PCR)
  - VBR (PCR, SCR, MBT)
  - UBR
- IEEE802.1p, IP QoS
  - 8-bit priority, DiffServ
  - Queuing strategies (SP, WRR, DWRR)
  - Traffic shaping

L1 Features
- xDSL Features
  - Impulse noise protection (INP)
  - Reed-Solomon Coding
  - Trellis-coded Modulation
  - Bit Swapping
  - Rate adaptation

Service Provisioning Features

Classification
- Flow ID
  - QoS

Metering
- srTCM
- trTCM

Marking

Congestion Avoidance
- WRED

Traffic Conditioning
- Policing - WRED + metering
- Shaping - single/dual leaky buckets

Congestion Management
- WFQ/WRR and/or Priority

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CPM Architecture and Tools Overview

**Tools** | **Description**
---|---
Service Activation and Delivery | Service configuration and monitoring
Fault Localization | Troubleshooting
Network Overview | Monitoring and alarm triggering
Service Behavior | Monitoring and alarm triggering
DSL Auto Optimizer | Service reconfiguration and update

**Clients**

**Server / DB**

- Tools for DSL network and service planning
- Tools for troubleshooting the loop and DSL layer
- Visualize data collected by Server (Scheduled or RT)
- Profiles and Scheduler configuration
- Data Aggregation
- Line Test Application (LTA)
- Scheduler + Database
- NE and NMS Interface

- NMS
- NBI
- SNMP
- NE
### QoS-related DSL parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attainable Rate</td>
<td>Attainable PHY rate estimate</td>
</tr>
<tr>
<td>Actual Rate</td>
<td>Actual line-rate</td>
</tr>
<tr>
<td>Actual Delay</td>
<td>Actual line delay</td>
</tr>
<tr>
<td>Actual SNR Margin</td>
<td>Actual SNR margin (running margin)</td>
</tr>
<tr>
<td>Errored Second (ES)</td>
<td>Errored Seconds, seconds with CRC errors</td>
</tr>
<tr>
<td>Severely Errored Seconds (SES)</td>
<td>Severely Errored Seconds, seconds with more than 16 CRC errors and/or other defects</td>
</tr>
<tr>
<td>Unavailable Seconds (UAS)</td>
<td>Line is unavailable (10 SES in a row)</td>
</tr>
<tr>
<td>Forward Error Corrections (FEC)</td>
<td>Corrected blocks, FEC events, packet is good data</td>
</tr>
<tr>
<td>Cyclic Redundancy Check (CRC)</td>
<td>Uncorrected blocks, CRC errors, packet drops</td>
</tr>
<tr>
<td>Cause of last Retrain</td>
<td>Cause of the last retrain</td>
</tr>
<tr>
<td>Number of Retrains (RT)</td>
<td>Number of retransmits since boot</td>
</tr>
<tr>
<td>HEC Counter</td>
<td>ATM header error correction counter</td>
</tr>
</tbody>
</table>
End-to-end resource allocation within BB Access Networks enables QoS control

- Fetching, processing and distributing BB access network resource status and allocation information automatically
- Optimal usage of BB access resources
Further details

> From WPC1:
  
  • M C1.5 Milestone: Management (Proposal for Network and Service Management in a Fixed Mobile Convergence Scenario) 08/2006
  
  • D C1.5 Deliverable: Nomadism Network Solution (Solutions to support nomadism in a fixed access network and dual packager roaming in a multi-operator scenario) 01/2007

> From WPC2:
  
  • MC2.4 Milestone: LQ&M Feedback (Evaluation of existing LQ&M solution based on feedback from lab trial verification…) 12/2006
  
  • DC2.4 Deliverable: Refined LQ&M Solution (A refined LQ&M solution including service assurance and network trend analysis…) 12/2007

> SPC PLATFORM DEMO!
Thank You!

Questions?