An Introduction to the Centre of Broadband & ATM at UCT
Outline

• Overview of the Centre of ATM & Broadband
• WUGS Related Projects
  • AAL2 Switching Node
  • Performance Evaluation Tools
  • ATM Scheduling Mechanism
• Mission & Long Term Goals
• Conclusion
Overview of the Centre in ATM and BroadBand Networks

- Started in 1997, currently 15 members
- Funding:
  - Telkom
  - Siemens
  - Department of Trade and Industry, via THRIP (Technology and Human Resources for Industry Programme)
Overview (cont.)

• Objectives of the centre:
  • Promote research & development in ATM & Broadband technologies
  • Train members and professionals to gain required expertise in this field.
  • Focus on more long term research goals, scalability and actual implementations
Overview (cont.)

• Research Conducted
  • Switching & Routing, e.g. PNNI
  • Access Technologies, e.g. ADSL & Wireless
  • Multimedia, e.g. Virtual Environments
  • Integration of ATM with other network technologies:
    • IP
    • SS7
WUGS @ UCT

• Our Centre is a participant in the Washington University Gigabit Distribution Program

• The WUGS will be used as a core component for a number of projects
  • AAL2 based switching node
  • Evaluations tools for ATM networks
  • An ATM Scheduling Mechanism (Hardware implementation)
AAL2 Based Switching Node

• Voice constitutes a large portion of traffic in public networks.

• Traditionally carried over circuit switching networks.

• Voice also carried over ATM as CBR / AAL1 traffic - highly inefficient.
AAL2 Switch (cont.)

- AAL2 far more efficient
  - Supports VBR traffic
  - Allows multiplexing of low bit rate channels, i.e. compressed voice in GSM
AAL2 Switch (cont.)

- Switching at ATM Level
  - Based on VPI / VCI
- Switching at AAL2 Level
  - Channel Identifier (CID) distinguishes voice channels
  - Therefore based on VPI / VCI / CID
- Benefits
  - Customer uses bandwidth efficiently.
  - Service provider can bill for more calls.
• AAL2 switch routes based on VPI / VCI / CID.
• Channels from incoming packets are broken up; combined with other channels to form outgoing packets.
• Simplifies network design.
Proposed Testbed for AAL2 Switching Node
Proposed Implementation

• AAL2 Switch Design
  • The Washington University Gigabit Switch (WUGS) will be used as the test bed.
  • Software / programmable FPGA’s would allow outgoing packets to be grouped according to CID values.
  • The FPGA programming would be done in VHDL on the RAD (Reprogrammable Applications Device) on the FPX board
Evaluation tools

• Traffic management algorithms need to be analysed to determine their effectiveness in providing required QoS
• Hence Development tools required
• NMVC (Network Monitoring Visualization & Control) will be used as a starting point in the design of these tools
• APIC and SPC will be used for implementation
ATM Scheduling Mechanism

- Focuses on the hardware design of a Generalized Processor Sharing (GPS) algorithm for scheduling of ATM cells
- Output cell scheduler
- FPX module to be used for implementation
- VHDL coding on RAD module
Long term goals & Conclusion

• Ensure that the outcome and implementation of research projects can be realised in practice, e.g. universal ATM testbed for UMTS services

• Stay at forefront of technology by acquiring the necessary tools for evaluation and implementation e.g. WUGS

• Continue to acquire the necessary funding.