Gigabit Kits Course
Welcome and Introduction

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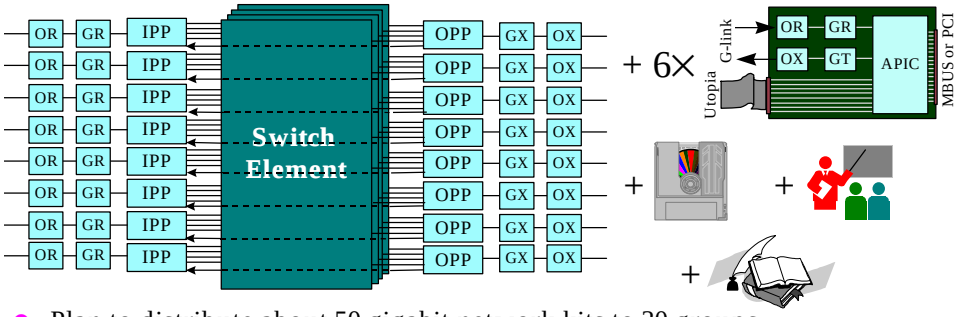
http://www.arl.wustl.edu/~jst/gigatech/kits.html

Gigabit Network Technology Distribution

- Motivation
  - » systems research requires low-level access and control
    - – detailed understanding of system behavior
    - – ability to modify and extend system capabilities
  - » commercial systems poorly suited to systems research
    - – constrained by standards and commercial requirements
    - – technical details considered proprietary
    - – unwillingness to support users with non-standard needs
- Target participants
  - » systems researchers (networking, distributed systems, OS, programming environments)
  - » applications researchers (HPC applications, multimedia, virtual reality)
  - » college faculty (use in laboratory-oriented systems courses)

Gigabit Network Kits



- Plan to distribute about 50 gigabit network kits to 30 groups
  - eight port switch (OC-3C, G-link line cards)
  - six APIC-based NICs with PCI, G-link and ribbon cable interfaces
  - software (test suite, switch controller, signaling, APIC driver)
  - training (two week intensive course for network managers)
  - documentation (software, hardware manuals and source)
- STS Technologies producing kits - additional parts can be purchased
- Follow-on workshops for sharing experiences and results
- Switches to be shipped in August, September with APICs to follow later

Potential Uses of Gigabit Kits

- End-to-end research
  - parallel and distributed applications on gigabit ATM base
  - distributed systems (shared memory, CORBA, network OS, . . .)
  - workstation clusters for inexpensive parallel computing
  - ATM signaling APIs for native ATM applications
  - multimedia applications, real-time multicast distribution
- Internet research
  - IP routing on ATM, IP switching
  - packet routing and queueing in gigabit networks
  - IP signaling (RSVP, Mbone)
- ATM research
  - signaling and switch control, network monitoring & management
  - cell level flow control (explicit rate, credit) and queue management
  - other new capabilities (reliable multicast support, VC switch on frame boundaries, fault tolerance, performance enhancements)

Purpose of the Course

- Help program participants get started using kits.
- Cover principles of operation of switches, NICs and associated software.
- Describe APIs available for systems/application software development.
- Provide hands-on experience so that participants can install, configure and use all hardware and software.
- Give particpants a chance to interact, share ideas and learn from each other.
- Resources for participants:
  - » http://www.arl.wustl.edu/~jst/gigatech/kits.html
  - » mailing list: gigabitkits@arl.wustl.edu
    - – join list to get updates
    - – send mail to list with questions, comments, feedback

Agenda

Day 1 (Monday)
- AM WUGS Architecture - Jon Turner
- PM IPP, OPP and SE Details - Andy Fingerhut

Day 2 (Tuesday)
- AM Operational Scenarios - John DeHart & Andy Fingerhut
- PM Switch Control Software - John DeHart

Day 3 (Wednesday)
- Switch Laboratory Session - How to use system that's up and running

Day 4 (Thursday)
- APIC Architecture - Zubin Dittia

Day 5 (Friday)
- AM APIC Software - Zubin Dittia
- PM APIC Laboratory

Day 6 (Saturday)
- Laboratory open for experimentation & ARL staff available for Q&A

Day 7 (Sunday)
- rest

Day 8 (Monday)
- AM APIC & Switch Hardware Details Will Eatherton, Dave Richard, Tom Chaney
- PM Coming Attractions

Day 9 (Tuesday)
- Lab Session - Creating and Running Simple Applications

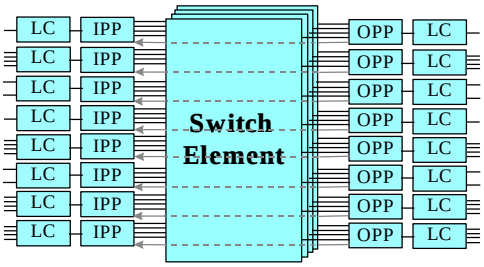
Day 10 (Wednesday)
- Lab Session - Installation & Configuration of Kits

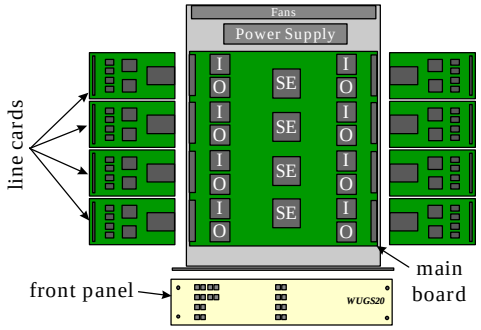
Day 12 (Thursday)
- Consulting & Open Lab Time

Logistics

- Parking
  - » parking passes on windshield
  - » yellow permit spaces
  - » please return passes on last day, so we can use for next session
- Lunch
  - » on your own
  - » options include food court on campus and Delmar Loop
  - » keep receipts for reimbursement

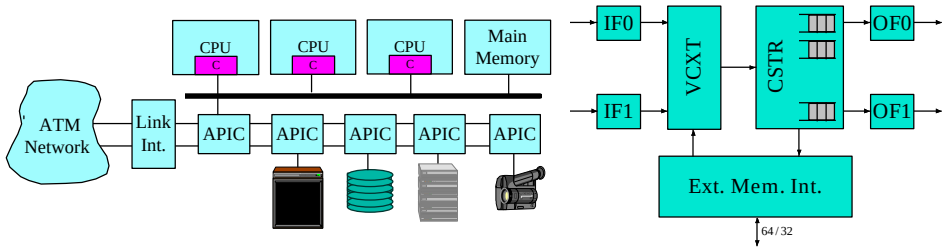
Washington University Gigabit Switch (WUGS)





- Eight port configuration
  - » two dual OC-3 line cards
  - » six G-link line cards (1.2 Gb/s)
  - » other line card configurations possible
- Supports remote configuration using control cells
- Open architecture enables experimental modification at all levels

ATM Port Interconnect Chip



- Two independent ATM ports at 1.2 Gb/s each
  - » daisy-chain configuration for direct device-to-network connection
  - » general interconnection topology for cluster computing
  - » 16 bit Utopia interface for direct connection and switch interface
- High performance data transfers to applications
  - » zero copy transfers using DMA with header stripping and page remapping
  - » direct user control of APIC channels with fully secure operation