DATACOMM

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Network Management

- Overview
- Service Levels
- Approaches to Net Management
- Diagnostic Methods
- Datacomm Test Equipment

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Network Mgmt Overview

- Network monitoring
 - quickly identify problems
- Network control
 - configuration & addressing
 - making devices available or unavailable
- Network troubleshooting
 - fix problem quickly
 - diagnose causes of problems and prevent repetition
- Network statistical reporting - optimize use of resources

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- What defines acceptable performance? - industry standards
 - contracts with users
- Elements of service level agreements (SLAs):
 - Availability
 - Reliability
 - Response Time
 - Throughput

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- Block error rate test (BLERT)
 - number of blocks requiring retransmission
 - BLERT = 1 (1-BERT)^b
 - · where b is the number of bits in the
 - block

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Service Levels

- Throughput
- Net bandwidth
- Number of useful (data) bits transferred per unit of time
- Usually significantly lower than total bandwidth because of overhead (control information, protocols, negotiation, handshakes)
- Transfer rate of information bits (TRIB) generally used definition of throughput
- Transaction processing systems measure transactions per second

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Network Management

Robert Lund (1991). The perils of flying blind. INTERACT 11(7):20.

Without managing system resources...

- You will not be alerted when it is time to tune the system for better performance
- You will miss opportunities to extend the life of your system
- You will not see early warning signs that point to a hardware upgrade requirement
- You will not know where you have been, where you are, or where you are going
- You will not be able to maintain a cool head in a performance crisis.

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Approaches to Net Mgmt

- Non-Automated Net Management
- Semi-Automated Net Management
- Integrated Network Management

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Approaches to Net Mgmt

Non-Automated Net Management

- Users call network control to report problems
- Little or no investment in tools
- High on-going costs
- Portable test equipment
- Complex networks difficult to service

Approaches to Net Mgmt

Semi-Automated Net Management

- Automatic network monitoring equipment & software
- Trigger alarms when error rates climb above critical levels
- Technicians must still diagnose problems
- Takes advantage of newer equipment
- Don't have to upgrade entire older network

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Approaches to Net Mgmt

Integrated Network Management

- Network management protocols
 - Simple Network Management Protocol (SNMP) for TCP/IP networks
 ISO Common Management Information
 - Protocol (CMIP)
- Reporting functions in all components
- Continuous automated monitoring
- Remote manipulation of all components
- Extensive graphics
- Expert systems

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Diagnostic Methods

- Loopback testing (echo testing)
 - special connectors feed output signal to input
 - especially useful for testing terminals
- Time Domain Reflectometry
 - feed pulses into circuit
 - measure characteristics of reflection
 - especially important for optical fibre networks

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Datacomm Test Equipment

- Especially important for non-automated and semi-automated network management
- Key tools of datacomm problem-solving: – Breakout Box
 - Datascope & Protocol Analyzers
 - Analog (phone line) test equipment



Datacomm Test Equipment

Datascope (Protocol Analyzers, Sniffers)

- Place in datacomm circuit
- All functions of breakout box
- Display screen shows data and control signals
- Data capture in buffers
- Phone or page staff on errors
- BERT and BLERT
- Filters screen data or packets
- Sniffers a serious threat to LAN, WAN & Internet security

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Homework

- Read Chapter 9 of your textbook in detail, adding to your workbook notes as appropriate.
- Review and be prepared to define or expand all the terms listed at the end of Chapter 9 of your textbook
- Answer exercises 9-1 through 9-11 on page 202 of the textbook using a computer wordprocessing program or absolutely legible handwriting (hand in after quiz tomorrow morning).

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