

L00 - Course Agenda - Infos

Datenkommunikation

384.081 - SS 2008

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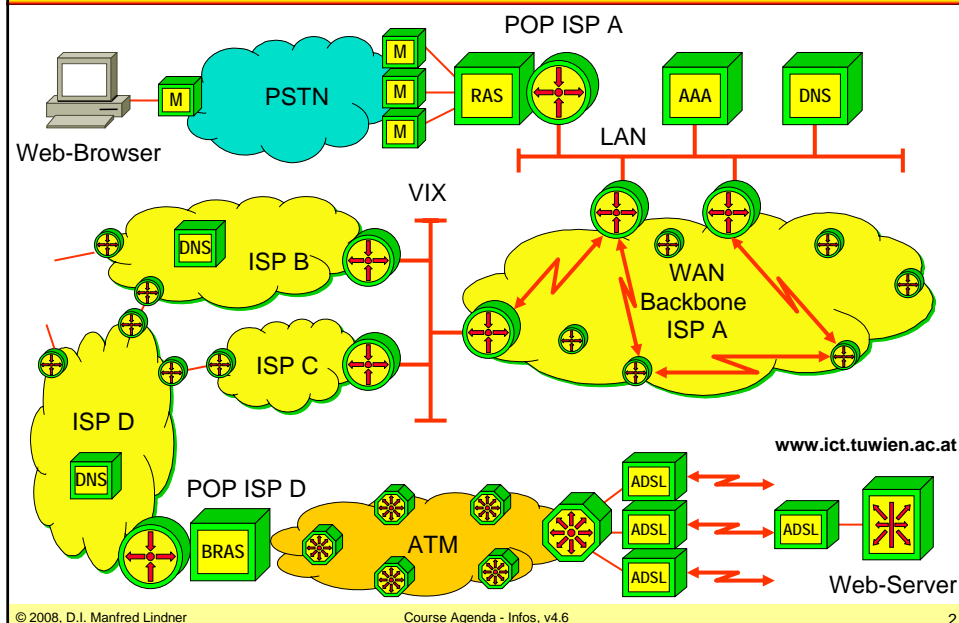
Home Page:

<http://www.ict.tuwien.ac.at/skripten/datenkomm/index.html>

Institut für Computertechnik

TU-Wien

Today's Internet Scenario



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Some of the Terms Used		Confused?	
Modem	Serial	IP Address	Connection-oriented
RS232	PSTN	AAA	Ethernet
Layer	Synchronous-TDM	Protocol	ISP
POP	Router	URL	Interface
Virtual Circuit	POTS	Authentication	IP Datagram
TCP	PPP	WAN	OSI
CSMA/CD	CHAP	Routing Protocol	DNS
Connectionless	ICPC	Peering Point	VIX
HTTP	RIP	WWW	Service
HTML	OSPF	BGP	Asynchronous-TDM
			Sequence-Number
			Packet Switching
			Cell Switching
			ATM
			Error Recovery
			ADSL
			Circuit Switching
			Bit

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Task of this Lecture
<ul style="list-style-type: none"> ● Solve the confusion <ul style="list-style-type: none"> – Show you one way through the “jungle” of data communication terminology ● How is the way constructed? <ul style="list-style-type: none"> – First learn about and understand fundamental principles – Find and study these principles in real data communication technologies ● Provide the fundament <ul style="list-style-type: none"> – For understanding current data communications technologies – For going deeper in that area by advanced lectures

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Lecture Modules SS2008		1
Data Communication Fundamentals 1		
Transmission Principles	Serial <-> Parallel Transmission, Bit-Synchronization Asynchronous <-> Synchronous Transmission, Encoding Framing, Frame-Synchronization, Data Transparency, Bit-stuffing, Byte-stuffing Error Checking and Detection, Checksum Physical Aspects, Fourier, Shannon, Nyquist, AM, FM	
Protocol Principles	3 Layer Model: Com-HW, Com-SW, Appl.-SW Service Types: Connectionless - Connection-oriented Error Recovery by ARQ: Idle RQ, Continuous RQ with Selective ACK, Go-BackN, Positive ACK, Selective Reject Sequence Numbers, Windowing, Timers, Pipe Capacity Flow Control HDLC Overview	
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Lecture Modules SS2008		2
Data Communication Fundamentals 2		
Time Division Multiplexing	Synchronous TDM (STDM) Statistical (Asynchronous) TDM (ATDM) Digital Voice Transmission, PCM PDH, E1 SDH	
Network Principles	Principles Circuit Switching (CS) Packet Switching (PS) Packet Switching Connectionless (PS CL) Datagram Service Packet Switching Connection-Oriented (PS CO) Virtual Call Service ISO OSI - 7 Layer Model Short Introduction of Legacy WAN Technologies: ISDN (CS) X.25 (PS CO) Frame Relay (PS CO) ATM (PS- CO) / Cell-switching	
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Lecture Modules SS2008		3
Local Area Network (LAN) Technology		
LAN Principles Legacy Ethernet	LAN Characteristics: Shared Media, Broadcast, Addressing IEEE 802: Media Access Control (MAC), Logical Link Control (LLC), DSAP, SSAP CSMA/CD, Slot Time, Framing, Ethernet v2, SNAP Transceiver, Repeater, Hub 10Base5, 10Base2, 10BaseT, FOIRL, 10BaseF	
Packet Switching on LANs: Transparent Bridging (Ethernet Switching) and Spanning Tree Protocol	Bridging Methods Transparent Bridging: Forwarding, Flooding, Filtering, Aging, Learning, Broadcast Storm Spanning Tree (STP) Rapid Spanning Tree (RSTP) Bridging versus Routing (Pro's and Con's)	
Ethernet Evolution L2 Switching and VLANs High Speed Ethernet Primer to WLAN	Ethernet Evolution, Collision Domain, Broadcast Domain Ethernet Switching (L2 Switching = Fast Transparent Bridging) VLAN (Virtual LAN) Technique, Tagging, Trunking, Full Duplex, Coding, Autonegotiation, Flow Control, Fast Ethernet (100BaseX), Gigabit Ethernet (1000BaseX) and 10 Gigabit Ethernet Introduction to Wireless LAN (WLAN)	
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Lecture Modules SS2008		4
IP Technology 1		
IP Technology	Principles: CL Packet Switching IP Host, IP Router, IP (CL) <-> TCP (CO) Story of Success, RFCs IP Protocol Details: TTL, Fragmenting, TOS, ... IP Addressing, Address Classes, Subnetting, IP Forwarding IP Forwarding and ARP IP Forwarding and ICMP ICMP Details Ping and Traceroute ARP PPP First Hop Redundancy: proxy ARP, IDRP, HSRP, VRRP	
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Lecture Modules SS2008		5
IP Technology 2		
IP Routing Overview	Static Routing Default Route Dynamic Routing: Distance Vector Technique versus Link State Technique Routing Information Protocol RIP: Basics, Count-to-Infinity Problem, maximum Hop Count, Split Horizon, Poisoned Reverse, Triggered Update, Hold Down RIP version Classful versus Classless Routing private Addresses and NAT Introduction to Internet Routing: Autonomous Systems, Interior versus Exterior Gateway Protocols, Introduction to BGP, CIDR	
OSPF Routing	Open Shortest Path First Introduction of Link State Concept (Topology database, LSA, The Dijkstra Algorithm, ...) Communication Procedures, LSA Broadcast Handling, Broadcast Networks, Summary of Benefits	
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Lecture Modules SS2008		6
Internet Transport Layer		
TCP Fundamentals UDP TCP Performance	Transmission Control Protocol: Concept of Ports and Sockets, TCP Connection Three Way Handshake, Handling of Sequence Numbers and Timers, Sliding Window and Flow Control User Datagram Protocol, Introduction VoIP TCP Performance: Slow Start and Congestion Avoidance Fast Retransmit and Fast Recovery	
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Lecture Modules SS2008		7
Applications for TCP/IP Administration		
BootP DHCP TFTP	Boot Strap Protocol Mapping of static IP address (MAC based) IP address of TFTP Server Filename for booting Vendor specific area: SBM, Def-GW, ... -> DHCP BootP Relay Agent Dynamic Host Configuration Protocol Leasing of dynamic IP address Mapping of static IP address (MAC based) Complete configuring of TCP/IP Protocol stack Trivial File Transfer Protocol UDP based IdleRQ Protocol	
DNS	Domain Name System Mapping Symbolic Names to IP addresses Tree-like Topology, FQDN DNS Server (primary, secondary), Resource Records Zone-Files, Root Hints, iterative/ recursive Lookup DNS Protocol	
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Appendix Modules SS2008		1
Advanced IP Switching / IP Routing Technology		
OSPF Areas	Backbone Area, Area Border Router, Intra- and Inter-Area Routes Autonomous System Boundary Router, Stub Areas, Virtual Link, Route Summarization Header Details	
MPLS (Multiprotocol Label Switching)	Introduction Problems with traditional IP over WAN MPLS Principles Label Distribution Modes MPLS Details (Cisco) Traffic Engineering	
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Appendix Modules SS2008		2
TCP/IP Standard Applications		
Telnet	Virtual Terminal, Remote Login Half duplex Device with printer facilities NVT Commands, Options	
FTP	File Transfer Protocol File OS contra File Transfer, Control port, data transfer port Protocol Interpreter, Data Transfer Process Active versus passive FTP	
SMTP - Email	Simple Mail Transfer Protocol E-Mail Basics, E-Mail address MUA contra MTA POP, IMAP, MIME	
HTTP - WWW	Hypertext Transfer Protocol History and Idea of Hypertext and WWW URL, Browser, GUI, HTML WEB Browser static, dynamic WEB Server static, dynamic	
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Recommended Literature
<ul style="list-style-type: none"> ● Data Communications, Computer Networks and Open Systems <ul style="list-style-type: none"> – Fred Halsall, Addison Wesley, 4th Edition 1996, ISBN 020142293X ● Computer Networking and the Internet <ul style="list-style-type: none"> – Fred Halsall, Addison Wesley, 5th Edition, 2005 ISBN 321263588 ● Computer Networks <ul style="list-style-type: none"> – Andrew S. Tanenbaum, Prentice Hall, 4th Edition, 2003 ISBN 0130384887
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Additional Information Sources

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- **Homepage of this course provides links for background information and details**

<http://www.ict.tuwien.ac.at/skripten/datenkomm/index.html>

- Collection of all Lectures of Manfred Lindner
 - all modules about data communication with actual version number
- TCP/IP - Tutorial:
 - <http://www.redbooks.ibm.com/pubs/pdfs/redbooks/gg243376.pdf>
- Internet Protocol Journal:
 - <http://www.cisco.com/ipj>
 - see "IPJ Content Overview" on homepage of lecture
- Authors Personal "Best of" Literature List

Additional Information Sources

2

- IETF RFC´s:
 - Internet standards
 - <http://ftp.univie.ac.at/netinfo/>
 - <http://www.rfc-editor.org/index.html>
- IEEE Free Download:
 - LAN standards
 - <http://standards.ieee.org/getieee802>
- ITU-T Free Standards Download:
 - International Telecommunication Standards -
 - <http://www.itu.int/ITU-T/publications/recs.html>

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Additional Information Sources

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- IP/MPLS Forum:
 - <http://www.ipmplsforum.org/>
 - Frame Relay Standards and White Papers (FR-Forum):
 - http://www.ipmplsforum.org/tech/fr_ia.shtml
 - ATM Standards and White Papers (ATM-Forum):
 - http://www.ipmplsforum.org/tech/atm_specs.shtml
 - MPLS Standards and White Papers (MFA-Forum, IP/MPLS-Forum):
 - http://www.ipmplsforum.org/tech/mpls_ia.shtml
- HTML / WWW Tutorial:
 - <http://www.selfhtml.org/>
- Cisco IOS documentation
 - UniverCD
 - Router IOS
- Wikipedia
 - <http://de.wikipedia.org/wiki/Hauptseite>
 - http://en.wikipedia.org/wiki/Main_Page

Learning by Understanding

- **Free Ethernet Protocol Analyzer:**
 - <http://www.ethereal.com>
 - <http://www.wireshark.org>
 - Download it and install it on your PC
- **Start analyzing your Internet activities!!!**

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