

NETWORK DESIGN MANUAL

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METROPOLITAN WASHINGTON
AIRPORTS AUTHORITY

NETWORK DESIGN MANUAL

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INFORMATION SYSTEMS OFFICE (MA-610)

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PREFACE

The Metropolitan Washington Airports Authority has a complex network infrastructure as well as a number of network systems supporting its operations. These network systems are constantly being upgraded and expanded to support the ever-changing requirements imposed on divisions within the Authority. This document will present the standards for drawings, both logical and physical, as they pertain to new network systems, expansion to existing systems, and modifications to the backbone infrastructure. The goal of this document is to provide direction for future network engineering endeavors by outlining the accepted layout and symbolism for computer network design. This standard is expected to influence the following areas:

- Logical drawings for concept presentation
- Installation drawings providing superior design accuracy
- “As Built” design providing a basis for ongoing support by the network contractor

This standards guide will pertain to all new systems development and all systems upgrade to be initiated within the Authority. This guide will provide direction for logical network representations, equipment representation, connection representation, overall drawing format, and cable identification and labels.

The Metropolitan Washington Airports Authority has installed, and continues to expand, a complex cable plant consisting of Fiber Optic Cable, both Single-mode and Multi-mode, and Category 5 Unshielded Twisted Pair Cable (UTP). All Single-Mode and Multi-mode fibers are terminated at Light Interface Units (LIU’s) located at various locations throughout the airport. To support network connectivity in the future, all new horizontal cabling will be Category 5 UTP or above. Vertical cabling will be accomplished using fiber optic cable that meets each individual build-out requirement. Single and Multi-mode fibers provide connectivity for the 1 Gigabit (802.3z) LAN Backbone and provide an upgrade path to the proposed 10 Gigabit Ethernet standard. Unshielded Twisted Pair cables are terminated at AT&T 110 Blocks. The 110 blocks, in association with RJ-45 patch panels, provide the termination point for all UTP cable. The airport standard for 110 block wiring and associated patch panels is EIA/TIA-568A.

During the evolution of the network environments within the Authority, many equipment vendors were employed to provide connectivity to the user community. This practice has required the Authority support equipment from 3Com, Bay, SMC, BOCA, and Cisco. With the complex nature of the network and the different equipment support requirements, it was determined that standardization on one vendor was the most cost effective approach to support and maintenance. The Metropolitan Washington Airports Authority has chosen to standardize on equipment provided by Cisco Systems. Based on that decision, the symbols presented in this guide are specific to that vendor. As new equipment becomes available from Cisco Systems, symbols will be developed and integrated into this guide. *It is the responsibility of the document*

generator to ensure that all symbols are properly represented. To meet this goal the document generator may be required to develop a symbol not included in this guide.

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SECTION I:

1.0 BASIC STANDARDS

1.1 NETWORK DRAWING APPLICATIONS

Microsoft's Visio is the application currently used by Authority contractors for the internal block network diagrams. Bentley's Microstation is the Authority's paramount CAD software for all drawing files. The Authority has recently accepted AutoCAD for Architectural Engineering contractors. Leaving Microstation as the only designated application for Civil and Structural designs. For record keeping purposes, all CAD drawings must be translated into Microstation and conform to the most current standard prior to final delivery to the Authority.

1.1.1 Visio

Microsoft's Visio 2000 enables Engineers to effectively design with the use of stencils and templates. Engineers can produce charts and flowcharts, design schematics and annotate CAD drawings and develop network designs. This program was designed to effectively import and export both AutoCAD and Microstation.

1.1.2 Microstation

The Authority has been using this software for more than ten years. Microstation historically has been used for all facets of Engineering. Making Network Design a task it will easily perform. Equipped with advanced geographic capabilities, this is likely to remain the CAD software of choice for the future.

1.1.3 AutoCAD

Due to contract requirements, the Authority supports this program. AutoCAD is a fairly new platform for the Authority. Its translation process into Microstation has been known to cause problems.

1.2 DESIGN CONCEPTS AND DOCUMENTATION

In order to meet Network Engineering requirements, the Information Systems Office of MA-610 must be notified at least ninety days in advance. Prior to any new network installations.

While drawings provide a visual guide to the construction of a network, specific information for each link is difficult to provide in the drawn environment. To ensure that construction of a network segment meets the requirements of the network, additional information shall be presented in the form of spreadsheets providing, at a minimum, the following information.

1.2.1 Switches and Hubs

Using either the hub or switch designation or, in the event of switches that accept cards, the switch and slot designation information pertaining to the individual connections will be maintained. This information will be compiled into a spreadsheet and kept up to date as connections are changed or moved. The spreadsheet will contain the following information: slot number (if appropriate), port number, connected to, speed or auto-sense, duplex (half or full), and connection type (SC, ST, or RJ-45).

1.2.2 Servers

Using the server name as the designator, list operating system, IP number and subnet mask (1.2.3.5/24), Primary function and any secondary functions.

1.2.3 Workstations

Identify workstations by use or location, operating system, IP number and subnet mask, and any special features.

1.2.4 Other Devices

Identify printers, scanners, terminals, plotters, etc., by function. Where applicable, identify IP number and subnet mask, or special connection speeds and configuration (9600,8,1,n), and special information necessary for the maintenance of the device in its operating environment.

A representative spreadsheet is presented below:

Table 1.0 - Spreadsheet

Slot/Port	TO:	Speed	Duplex	IP Number
2/1	Primary Domain Controller	100	Full	10.1.1.3/24
2/2	Secondary Domain Controller	100	Full	10.1.1.4/24
2/3	Database Server	100	Full	10.1.1.5/24
2/4	Admin Workstation	100	Full	10.1.1.201/24
2/5	Open			
2/6	Communications Server	10	Half	10.1.1.105/24
3/1	Workstation - Tom	100	Full	10.1.1.210/24
3/2	Workstation - Marry	100	Full	10.1.1.211/24
3/3	Workstation - Joe	100	Full	10.1.1.212/24
3/4	Workstation - Sue	100	Full	10.1.1.213/24
3/5	File/Print Server 1	100	Full	10.1.1.7/24

3/5	Open			
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1.3 DRAWING FILE NAMES AND STANDARDS

All CAD drawing files should comply with the Authority Design Manual, Appendix 3, and CADD Standards. The following standards are designed for the Microstation application. Each file shall consist of elements to be printed only. All levels shall be turned on.

Drawing file names shall display project number, month and year.
(EXAMPLE..... 8809-0101)

Each drawing file will consist of graphics pertaining to only one drawing. Drawing files consisting of more than one drawing will not be accepted.

The working units shall be in feet and inches. If your drawing covers a large area with a variance in accuracy, this is the only exception. The Microstation Master Seed file's working units are set at 12:8000 for DCA and 10:1000 for IAD.

When designs are displayed over a Civil background, drawings shall use the 3D Master seed file. Area background drawings shall be requested through MA-30 and then attached to design files as a Reference File.

The standard font shall be Font 23 for existing documentation and Font 1 for proposed documentation. If equal spacing is needed, Font 3 is then authorized.

Table 2.0 - File Name Extensions

File Name	Extensions
Visio Drawing Files	.VSD
Visio Stencils	.VSS
AutoCAD Drawing Files	.DWG
AutoCAD Block Files	.BLK
Microstation Drawing Files	.DGN
Microstation Cell Libraries	.CEL

Table 3.0 - Scale Factors (Text and Drawings)

Drawing Scale	Factor
None	1
1/16" = 1'-0"	192
1/8" = 1'-0"	96
1/4" = 1'-0"	48
1/2" = 1'-0"	24
1" = 1'-0"	12
1" = 10'	120
1" = 20'	240
1" = 40'	480
1" = 50'	600
1" = 100'	1200

Table 4.0 - Text Sizes (Fonts 1, 3, and 23)

Type	Text Size	Weight
Main Title	1/4" (0.25)	4
Subtitle	3/16" (0.18)	2
Notes	1/8" (0.12)	2

Drawings with attached Civil backgrounds, must utilize the Airport Grid Coordinate System. For details, please refer to the Design Manual, CADD Standards, Appendix 3, Figure-1-1 and 1-2.

For Line Weights, Color and Line Codes, please refer to the Design Manual, CADD Standards, Appendix 3, Tables 4-6.

1.4 PLOTTED DRAWINGS

All plotted drawings will have the file name, date and time placed outside the lower right hand border (Font 1, Text size .25 inches). Plotted drawings shall comply with applicable ANSI standards and placed on the appropriate size paper to best visualize the design. See table below:

Table 5.0 - Standard Sheet Sizes

Drawing Sheet	Size
A	8 1/2" x 11"
B	11" x 17"
C	17" x 22"
D	22" x 34"
E	34" x 44"

1.5 TRANSLATIONS AND DOCUMENT FORMATS

Prior to final design delivery to the Authority, all Visio and AutoCAD drawings shall be translated into the current version of Microstation. Each drawing shall then comply with applicable standards. Drawings that do not comply with standards will be rejected.

1.6 FILE EXCHANGE

The following specifies requirements concerning the delivery of all network CAD designs to the Authority.

Hard copies of the drawing design will be submitted along with PKZIP self extracting files on a 3 1/2 inch disk or CD.

This disk shall consist of appropriate drawing files and a text file listing, identified as (README.TXT).

The text file should list all file names on the disk and provide a detailed description of each files contents.

SECTION II:

2.0 CONNECTIVITY DESIGN RECOMMENDATIONS

To ensure the continued operation and evolution of both packet and switched networks, a recommendation for building connectivity has been developed for both new and expansion construction. This recommendation addresses the connectivity, both fiber optic and copper cables, termination, identification and power requirements.

These recommendations will provide a baseline for network infrastructure installation and ensure physical and bandwidth expansion.

2.1 NEW CONSTRUCTION

During the design phase of new facilities, ongoing, proactive planning is essential in meeting infrastructure and bandwidth growth requirements. Specific challenges, unique to the telecommunications/data communications systems, must be addressed to ensure network evolution. With the development of new communications standards, and new equipment to support these standards, a coordinated effort between facilities designers and communications professionals is necessary to project requirements of future system and implement these requirements into facilities being built today.

2.1.1 External Cable Feed

While the design of each structure will affect where cable is brought into the facility, general guidelines are presented to ensure, where possible, no single points of failure exist and alternate bandwidth paths are provided.

To achieve this goal, cable ducts, providing a path for intra-building connectivity, should be positioned so that dual cable paths are provided. These paths should be installed on opposite sides of a structure, whenever possible, or on adjacent sides, when necessary, to eliminate a failure due to cable damage.

Due to the high costs associated with multiple cable ducts, not all construction will implement this recommendation. Each project will require careful evaluation to see if this recommendation is applicable.

2.1.2 Power Requirements

Power requirements are divided into two (2) categories: standard and emergency.

2.1.2.1 Standard Power

Each equipment closet will be provided with a minimum of two (2) independent electrical circuit, non-switched, to provide power for network equipment. These circuits will provide 110 Volts, 20 Amps to Quad plug outlets.

2.1.2.2 Emergency Power

Each equipment closet will be provided with emergency power. The emergency power source may be an Uninterruptible Power Supply (UPS) fed by standard power or an in-line Uninterruptible Power Supply (UPS) that conditions input power and is always in use. If an emergency bus is provided, an emergency generator, 30 minutes of UPS power will be required. If no emergency bus is available the minimum requirement for UPS support will be 2 hours. In the event of an emergency bus is provided, cut over to emergency power should not require manual intervention.

The required power, KVA, for each UPS will be determined by the equipment associated within the supported area.

2.1.3 Cable Requirements

Cable requirements will differ with the structure requirements however; minimum standards have been identified to ensure connectivity and future growth.

2.1.3.1 Intra Building

In order to provide connectivity to the existing Authority network, new construction will provide fiber optic and/or copper cabling to each new construction site, as determined during planning. When a design requirement requires the construction of dual cable ways, these cable ways will be constructed so as to ensure connectivity should one cable way be destroyed or otherwise disabled.

2.1.3.2 Inter Building

In order to provide connectivity to the existing Authority network, new construction will use category 5, or above, UTP to provide a horizontal wiring plant. Network cables will be home run to the communications closet and will not be daisy chained. Where multiple floors are involved, fiber optic cable will provide connectivity between floors. The number of cables and/or fibers will be determined during the design phase of the project and should be reviewed by both the Telecommunications (MA-620) and Information

Systems (MA-610) Departments. Network connections will be provided wherever a telephone connection is provided or as designed.

2.1.4 Communication Closet Requirements

Communication Closets provide two functions: they provide a connection point for backbone cables and as the distribution point for user connectivity. Whether building input cables are terminated in a closet or it functions as a distribution point the minimum layout and configuration for closets is defined below.

- Communication closets will be a minimum of 8'X8'.
- The Main Communication closet will be defined as the point where external cables are terminated in the building.
- There will be a minimum of one communication closet per floor. These closets will support both telephone and data access. Data and telephone termination blocks will be separated as room size and design allows.
- Access to communication closets will be controlled using card swipes and keypads or other means that restrict access.
- Additional communication closets will be required when the distance between a closet and its furthest supported data end-point exceeds 270 feet or approximately 80 meters. This provides a minimum standard for Office Space while allowing greater distances between closets when in warehouse or storage areas.
- When a building has multiple floors, communication closets should be arranged so that the closets are directly above one another. This ensures direct access between closets and also provides for the shortest cable path.

2.1.5 Network Port Numbering Scheme

In order to identify port location, for new installation and for existing identification, all data ports will be numbered in a consistent manner. Numbering shall be done at the distribution point and at each end point. The following standard shall be applied to all data ports within the Authority. When an entire campus is being represented, building numbers will be applied to identify the exact location.

2.1.5.1 Room and Jack Number

Each room within a building will be identified with a room number. When in multiple floor structures it is assumed that each room number will start with the floor number i.e., 101 is on the first floor, 201 is on the second floor, etc. When room numbers do not identify a floor a leading number and a dash will indicate the floor i.e., 2-10 is room 10, second floor. Data jacks within each room will be identified, in a clockwise rotation around the room, with the port number of the jack within the room. A typical data number would be: 2-10-4 or 210 – 4.

2.1.5.2 Patch Panels and Equipment Ports

Patch panels are located in communications closets. These devices are rack mounted and will be numbered using the panels location on the rack; top being A, next down being B, etc. The ports on a patch panel will be numbered from left to right and from top to bottom; 1 – 12, 2 – 24, etc.

Equipment ports will be numbered using row or blade number and port number. This is the standard used within Cisco's IOS on switches. Equipment port numbers will be represented using the following numbering scheme: 1-1, 1-2, ... 3-23, 3-24, etc.

All connected ports will be identified within the IOS, when applicable, to identify the edge device (Users Name or Port Number, Servers Name, etc.). This is the responsibility of the technician connecting the data port.

2.2 EXPANSION CONSTRUCTION

During the planning for, and the remodeling of existing facilities, telecommunications and networking personnel should be consulted to provide connectivity requirements. Specific issues can be addressed that ensure connectivity and future growth. All areas listed under Section 2.1 of this document may apply to expansion construction.

SECTION III:

3.0 SYSTEMS INEGRATION

System integration, as used here, is the process of installing, testing and putting a new system into operation where an interfaces with the Authority network is required. Any system that interfaces to the authority network will require a minimum 30-day notice be provided to MA-610 to ensure all Authority requirements are fulfilled.

3.1 INTERNET / TRANSMISSION CONTROL PROTOCOL (TCP/IP)

Any system that requires TCP/IP numbers must request such numbers from MA-610. No system may be installed onto the Authority network without meeting MA-610's numbering scheme.

3.2 DOMAIN NAMES AND RELATIONSHIPS

Any Domain Name requirements or special relationships required to interface with the Authority network must be submitted to MA-610 for review and approval.

3.3 SPECIAL REQUIREMENTS

In the event special considerations are required for a specific project or demonstration, such as bypassing "WebSence" or allowing specified traffic through the firewall, a written request must be presented to MA-610 with sufficient time for the technical staff to review, evaluate and, if approved, support the action requested.

SECTION IV:

4.0 DRAWING SPECIFICATIONS

In this section, we will provide specifics for design and presentation standards. Items in this section are subject to change. Contact the Information Systems Office of MA-610 for the current items. All items are based on the final presentation in a Microstation format.

4.1 BORDER SHEETS

The standard border sheet is currently being constructed by MA-30 and will soon be available through the Authority Web Site (www.mwaa.com). Select “Publications” and download the appropriate border. If necessary, contact the Information Systems Office for further assistance.

4.2 CELLS, BLOCKS AND STENCIL LIBRARIES

The most current libraries are being developed and once completed, will be available through the Authority Web Site (www.mwaa.com). Select “Publications” and download the appropriate library. If necessary, contact the Information Systems Office for any assistance.

4.3 ELECTRICAL NETWORK LEVELING SCHEME

The following reflects the Authority’s Electrical Leveling Scheme, as defined in the Design Manual, CADD Standards, Appendix 3 2000 publication.

Table 6.0 - Leveling Scheme

Level / Layer	Description	Remarks
1	User Defined	
2	Building Outline	
3, 4	User Defined	
5	Riser Diagrams	
6	Flow Diagrams	
7	Control Diagrams	
8	Single-Line Diagrams	

9	Demolition – Items to be removed	
10	Demolition – Items to remain	
11	User Defined	
12	Electrical Equipment (Above Ground)	
13	Electrical Equipment Below Ground	
14	Junction Boxes	
15	User Defined	
16	Switches	
17	User Defined	
18	User Defined	
19	User Defined	
20-29	Lighting	
30	Wiring Cables	Power
31	Receptacles, Clock Outlets, etc..	Power
32	Busway, Cable Tray, Wireways	Power
33	Symbols	Power
34	Text	Power
35	Wiring Cables	Circuit Lines
36	Circuit Identifier Tags	Circuit Lines
37	Controls	Circuit Lines
38	Symbols	Circuit Lines

39	Text	Circuit Lines
40	Circuits	Ground System
41	Ground System	Ground System
42	Symbols	Ground System
43	Text	Ground System
44	User Defined	
45	Wiring Cables	Security Systems
46	Routers	Network Systems
47	Gateways	Network Systems
48	Bridges	Network Systems
49	Servers	Network Systems
50	Appliance Firewalls	Network Systems
51	Firewalls	Network Systems
52	Main Switch	Network Systems
53	Hubs	Network Systems
54	Databases	Network Systems
55	Workstations	Network Systems
56	Terminals	Network Systems
57	Scanners	Network Systems
58	Printers	Network Systems
59	Cisco Routers	Network Systems
60	Cisco Switches	Network Systems

61	Cisco Servers	Network Systems
62	Cisco Firewalls	Network Systems
63	User Defined	

APPENDIX A

GLOSSARY OF TERMS

- 1.0 Routers – The Metropolitan Washington Airports Authority uses Cisco Routers to meet need to transport information between divisions and/or airports. The 7500, 4500, 3600, 2500, and 1600 families of router are either in place or planned for immediate installation within the Authority. When using the symbols associated with each router family include the model number, number of serial ports and the number of Ethernet ports and the speeds and connectors associated with each port type i.e., ST, SC, RJ-45 and 10 Mbps, 100 Mbps, 1Gbps, 750 Kbps, T1, etc. Where possible the drawings should indicate the IP number, Net Mask and routing protocol associated with each link.
- 2.0 Communications Server – The Authority currently uses a Cisco 5200 to provide dial-up capability to the service networks. This system is presently configured with one (1) PRI line providing 24 lines in a rotary access method. This unit can be upgraded with an additional PRI line to provide 24 more lines if the need should arise. Any additional dial-up services, beyond the 24 available with another PRI line, will require a Cisco 5300 Communications Server or greater version of the Cisco Communication Server.
- 3.0 Firewall – The Authority networks are protected from unauthorized users by the Cisco PIX firewall appliance. This device provides firewall protection and supports the WebSense product. PIX firewalls are to be installed at both airport facilities. The diagram of the PIX firewall should indicate each network supported as well as identify the DMZ(s) and Service Networks. Future firewall installations may require the implementation of a Proxy-type firewall system. In the event this becomes necessary, a server should be identified as a firewall, indicate the Operating System, firewall software installed and list the active interfaces and their functions (DMZ or Service). The IP number and Net Mask associated with each port should be identified.
- 4.0 Main and Workgroup Switches – The switches used within the authority have been provided by a number of vendors including Cisco, Bay and 3Com. For all future networks the Cisco switch has been selected as the Authority Standard. Acceptable switches include the Cisco 6500, 5500, 5000, 4000, 3600 and 2900 Family of switches. The appropriate diagram(s) will represent these switches and notations as well as a card-by-card listing of ports, their termination points, speed and duplex, as well as the connection supported. Each card listing will also indicate any VLAN configurations within a switch and between switches. Notations of SNMP and/or RMON management and reporting will be indicated.
- 5.0 Hubs – Hubs have been historically used to provide connectivity to small groups of users throughout the Authority. This practice is no longer being supported due to the complexity and traffic requirements of new, CPU and network demanding, applications. It may be in the best interest of the Authority to use hubs when building and/or connecting special

purpose servers and their associated workstations. In the event hubs are proposed it is up to the respondent to represent the hubs and to provide connectivity listings. Information on SNMP and/or RMON capability should also be listed.

6.0 Servers – The Authority has standardized on the Dell Computer family of servers to provide general application support to the user community and on Digital Equipment Corporation (DEC) equipment where special applications are required. These servers can be used in a number of areas. This class of server should identify servers as Application Servers, Database Servers, Gateways, Video Server, or any other function that is supported. When a server acts in a multiple application environment, the primary application should be identified with the server. Where the Authority uses Digital Equipment Corporation (DEC) equipment the primary machines belong to the Alpha Series of Servers, currently the Alpha 1000 and Alpha 4000. Where the Dell Servers are utilized the primary systems include the Dell 1300, 2400, 3400, 4400, 6300, 6350, and the Dell 6400 Servers.

7.0 Workstations – The Authority has standardized on the Dell Computer family of workstations. The primary workstation is the Dell OptiPlex GX1p. The configuration of this workstation varies with the application that it is expected to support.

8.0 Terminals – The Authority has used dedicated terminals in very few instances. These cases are associated with special purpose systems that require a terminal to act as the console for the system.

9.0 Scanners and Printers – The Authority primary manufacturer of choice for scanners and printers has been Hewlett-Packard.

APPENDIX B

NETWORK ABBREVIATIONS

A

AAL	ATM Adaptation Layer
AAL-PCI	AAL Protocol Control Information
AAL-SDU	AAL Service Data Unit
ABR	Available Bit Rate (s. CBR, UBR, VBR)
ACE	Access Connection Element
ACF	Access Control Field (in DQDB slot)
ACSE	Association Control Service Element
ADM	Add/Drop Multiplexed
ADMD	ADministrative Management Domain / Differential
ADPCM	Adaptive Delta/Differential Pulse Code Modulation (32Kbps pro Kanal, vgl. CS-ACELP, PCM)
ADSL	Asymmetric Digital Subscriber Line
AESA	ATM EndSystemAddress (PNNI)
AFI	Address Format Identifier/Authority and Format Identifier
AMI	ATM Management Interface (FORE)
AIMS	Action team for the Integration of Management Systems
AINI	ATM Inter-Network Interface
AIP	ATM Interface Processor (Cisco 7000)
AIS	Alarm Indication Signal (=OAM-cell/UNI Fault Management)
AIX	Advanced Interactive eXecutive (=IBMs UNIX)
AMI	Alternate Mark Inversion / ATM Management Interface (FORE)
AMS	Audio visual Multimedia Services
ANIS	ATM Narrowband Interface S2 (Siemens)
ANNI	Interconnection of PNNI and CCS7
ANSI	American National Standards Institute
API	Application Programming Interface
APPC	Advanced Peer-to-Peer Communication
APPN	Advanced Peer-to-Peer Networking
APS	Automatic Protection Switching
APTMD2	ATM Port Trunk Modul (2 Ports, Siemens)
ARA	Appletalk Remote Access; externes Zugangsprotokoll
ARM	ATM Router Modul (Cisco)
ARP	Address Resolution Protocol
ARQ	Automatic Repeat reQuest
AS	Autonomous System (OSPF)
ASE	Application Service Element
ASIC	Application Specific Integrated Circuit
ASN.1	Abstract Syntax Notation One
ASN32	ATM Switching Network (32x32 Matrix, Siemens)
ATDM	Asynchronous Time Division Multiplexing (vgl. STD, TDM)
ATM	Asynchronous Transfer Mode; Automatic Telling Machine; Air Traffic Management; Adobe Type Manager
ATMARP	ATM Address Resolution Protocol
AU	Administrative Unit
AUI	Attachment Unit Interface

AW

Administrative Weight

B

B-ICI	Broadband Inter Carrier Interface (= carrier to carrier interface)
B-ISDN	Broadband Integrated Services Digital Network
B-ISDN PRM	Protocol Reference Model of the Broadband aspects of ISDN
B-LLI	Broadband Low Layer Information
B-NT2	Broadband Network Termination 2 for B-ISDN
BCD	Binary Coded Decimal
BECN	Backward Explicit/Error Congestion Notification
Bellcore	Bell Communications Reseach
BER	Bit Error Rate / Basic Encoding Rules (ASN.1)
BGAK-PDU	BeGin AcKnowledged PDU
BGN-PDU	BeGiN PDU
BGP	Border Gateway Protocol
BGREJ-PDU	BeGin REJect PDU
BIND	Berkeley Internet Name Dämon (Name-Server Version)
BIOS	Basic Input/Output System
BIP	Bit Interleaved Parity
BNP	Board Network module Port (FORE)
BoM	Begin of Message
BootP	Bootstrap Protocol
BRI	Basic Rate ISDN/Interface
BSD	Berkeley Standard Distribution
BT	Burst Tolerance
BUS	Broadcast and Unknown Server

C

CAC	Connection/Call Admission Control
CAD	Computer Aided Design
CAM	Computer Aided design Manufacturing
CAP	Carrier-less Amplitude / Phase modulation (s. DMT)
CAR	Customer Access Rate
CASE	Computer Aided Software Engineering
CB	Control Block (Siemens)
CBDS	Connectionless Broadband Data Service (fast identisch mit SMDS)
CBER	Cell Block Error Ratio
CBR	Constant Bit Rate (s. ABR, UBR, VBR)
CCF	Cross Correlation Function
CCITT	Comite Consultatif International pour le Telegraphe et Telephone / Consultative Committee on International Telephone and Telegraph (now ITU)
CCSS7/B-ISUP	Common Channel Signaling System7/Broadband-ISDN Signaling User Part (von ITU-T, entspricht PNNI)
CDPD	Cellular Digital Packet Data (de facto model for Omnipoint implem.)
CDR	Cell Rate Decoupling
CD-ROM	Compact Disk Read Only Memory
CDS	Cell Directory Services (vgl. GDS)
CDV	Cell Delay Variation

CDVT	Cell Delay Variation Tolerance
CEC	Common Equipment Card
CEQ	Customer Equipment
CER	Cell Error Ratio
CERN	Centre Europeen pour la Recherche Nucleaire
CERT	Computer Emergency Response Team
CES	Circuit Emulation Service
CGA2	Clock Generator ATM (Release 2, Siemens)
CGI	Common Gateway Interface
CHAP	Challenge Handshake Authentication Protocol (vgl. PAP)
CI	Command Interpreter (MADGE)
CID	Configuration, Installation & Distribution
CIDR	Classless Inter-Domain Routing
CIF	Common Intermediate Format Format 352x288 pixel/frame, 30 frames/sec
CIM	Common Information Model
CIO	Chief Information Officer
CIP	Common Indexing Protocol
CIR	Committed Information Rate
CIVA	Computer Integrated Video on ATM (VideoKonferenz-System, Siemens)
CLEI	Common Language Equipment Identification
CLI	Command Line Interface
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CLNAP	ConnectionLess Network Access Protocol
CLNIP	ConnectionLess Network Interface Protocol
CLNP	ConnectionLess Network Protocol
CLNS	ConnectionLess Network Service
CLP	Cell Loss Priority
CLR	Cell Loss Ratio
CLS	ConnectionLess Server
CLSF	ConnectionLess Service Function
CLTS	ConnectionLess Transport (Layer) Service
CME	Conformant Management Entity (OMNIPoint)
CMIP	Common Management Information Protocol (OSI)
CMIS	Common Management Information Services (OSI)
CMISE	Common Management Information Service Element (OSI)
CMOL	CMIP Management Over logical Link control
CMOT	CMIP Management Over TCP/IP
CMR	Cell Misinsertion Ratio
COLP	COnnected Line identification Presentation
COLR	COnnected Line identification Restriction
CoM	Continuation of Message
CON	CONcentrator
CORBA	Common Object Request Broker Architecture (OMG)
COSE	Common Open Software Environment
COSINE	Cooperation for OSI Networking in Europe
COTS	Connection Oriented Transport (Layer) Service
CPCS	Common Part Convergence Sublayer
CPE	Customer Premises Equipment
CPU	Central Processing Unit
CR-LDP	Constraint-based Routed Label Distribution Protocol
CRC	Cyclic Redundancy Check
CRF	Connection Related Function

CRM	Cell Rate Margin
CRV	Call Reference Value
CS	Convergence Sublayer (Schicht in AAL)
CS-ACELP	(Sprachkompression, 8Kbps pro Kanal, vgl. ADPCM, PCM)
CSi	Carrier Scale interworking
CSMA/CD	Carrier Sense Multiple Access with Collision Detection
CSU	Channel Service Unit
CTD	Cell Transfer Delay
CTS	Common Transport Semantics

D

DAC	Dual Attached Concentrator (FDDI)
DARPA	Defense Advanced Research Projects Agency (früher nur ARPA)
DAS	Dual Attached Station (FDDI)
DCC	Data Country Code
DCE	Distributed Computing Environment, Data Communications Equipment
DCT	Discrete Cosinus Transformation
DDCMP	Digital Data Communication Message Protocol (DEC)
DDI	Direct Dialling In
DE-CIX	Deutscher Commercial Internet eXchange
DE-NIC	DEutsches Network Information Center
DES	Data Encryption Standard
DFI	Domain Specific Part Format Identifier
DFN	Deutsches ForschungsNetz
DFS	Distributed File Service (vgl. DTS)
DHCP	Dynamic Host Configuration/Control Protocol
DIB	Directory Information Base (X.500)
DiffServ	Differentiated Services (IETF, vgl. IntServ)
DIT	Directory Information Tree (X.500)
DLC	Data Link Control
DLCI	Data Link Connection Identifier (in Frame Relay)
DLE	Distributed LAN Emulation
DLL	Dial Long Lines
DMA	Direct Memory Access
DME	Distributed Management Environment (OSF)
DMI	Desktop Management Interface / Definition of Management Information
DMT	Discrete Multi-Tone (multicarrier modulation, s. CAP)
DNA	Digital Network Architecture
DNS	Domain Name System / Service
DOMS	Distributed Object Management System
DPT	Dynamic Packet Transport (Cisco)
DQDB	Distributed Queue Dual Bus (MAN, normiert von IEEE)
DRAM	Dynamic Random Access Memory
DS1	Digital System/Signal level 1 (US: T1=1.544Mbps, Europe: E1=2.048Mbps)
DS3	Digital System/Signal level 3 (US: T3=44.736Mbps, Europe: E3=34.368Mbps)
DSA	Directory System Agent (X.500)
DSAP	Destination Service Access Point
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
DSP	Domain Specific Part

DSS	Distributed Sample Scrambler (Kodierverfahren mit Polynom $X^{31}+X^{28}+1$, -> SSS)
DSU	Data Service Unit
DTD	Document Type Definition (WWW)
DTE	Data Terminal Equipment
DTL	Designated Transit List
DTMF	Dual Tone Multiple Frequency
DTS	Distributed Time Service (vgl. DFS)
DUA	Directory User Agent (X.500)
DVMRP	Distance Vector Multicast Routing Protocol
DWDM	Dense Wavelength Division Multiplexing
DWMT	Discrete Wavelet Multi-Tone
DXI	Data/Digital eXchange Interface (bindet Router via DSU an ATM-Switch)

E

E1	2.048Mbps = DS1 in Europe
E3	34.368Mbps = DS3 in Europe
EBCDIC	Extended Binary Coded Decimal Interchange Code
EFCI	Explicit Forward Congestion Indicator
EGP	Exterior Gateway Protocol
EIA	Electronic Industries Association
EIGRP	Enhanced IGRP
EISA	Extended Industry Standard Architecture
ELAN	Emulated LAN
EMS	Element Management System
END-PDU	END PDU
ENDAK-PDU	END AcKnowledged PDU
EoB	End of Bus
EoM	End of Message
EPD	Early Packet Discard (s. PPD)
ERIP	Extended RIP
ESF	Extended Super Frame (DS1: = 24 x 193Bits)
ESI	End System Identifier
ESIG	European SMDS Interest Group
ESP	Encapsulating Security Payload (IP)
ETDM	Electrical Time Division Multiplex
ETSI	European Telecommunication Standards Institute

F

FAST	Frame ATM over Sonet Transport
FC	Fiber Connector (Stecker-Typ)
FCS	Frame-Check Sequence
FDDI	Fiber Distributed Data Interface (MAN, normiert von ANSI)
FDM	Frequency Division Multiplexing
FEBE	Far End Block Error (SONET)
FECN	Forward Explicit/Error Congestion Notification
FERF	Far End Receive Failure/Far End Reporting Failure (= OAM cell)
FIPS	Federal Information Processing Standard
FNNI	Frame UNI
FPGA	Field Programmable Gate Arrays
FR	Frame Relay

FSM	Finite State Machine
FTAM	File Transfer Access & Management
FTP	File Transfer Protocol
FUNI	Frame based User-to-Network Interface (ATM Forum)

G

GCAC	Generic Connection Admission Control
GCRA	Generic Cell Rate Algorithm
GDMO	Guidelines for the Definition of Managed Objects (OSI)
GDS	Global Directory Services (vgl. CDS)
GFC	Generic Flow Control (in ATM cell)
GFR	Guaranteed Frame Rate
GLP	Gateway Location Protocol (VoIP, IETF, s. SLP)
GOSIP	Government Open Systems Interconnection Profil/ Government OSI Profile/Protocol
GPRS	General Packet Radio Services
GPS	Global Positioning System (Satelliten-System)
GSM	Global System for Mobile communications
GSR	Gigabit Switch Router (Cisco)
GUI	Graphical User Interface

H

HCS	Header CheckSum / Sequence
HDLC	High level Data Link Control (Proto auf OSI Schicht2, vgl. SDLC)
HDTV	High Definition TeleVision (benötigt 5-20 Mbps)
HEC	Header Error Control/Check (in ATM cell und DQDB slot)
HLF	Higher Layer Function
HMI	Hub Management Interface (Standard von Novells NDMS f. Hub-Management)
HO-DSP	High Order - Domain Specific Part
HoB	Header of Bus
HOL	Header Of the Line
HPPI	High Performance Parallel Interface
HSRP	Hot Standby Router Protocol
HSSI	High Speed Serial Interface (Standard zur ser Übertr. mit 52 Mbps)
HTML	HyperText Markup Language (WWW)
HTTP	HyperText Transfer Protocol (WWW)
HTTPS	Secure HyperText Transfer Protocol (WWW)

I

I-PNNI	Integrated Private Network to Network Interface
I4DL	Interface, Inheritance, Implement., Install. Definition Language (OSF)
IAB	Internet Activities Board
IANA	Internet Assigned Numbers Authority
ICD	International Code Designator
ICMP	Internet Control Message Protocol
ICR	Initial Cell Rate
IDI	Initial Domain Identifier
IDL	Interface Definition Language (OMG)

IDP	Internet Datagram Protocol; Initial Domain Part
IDRP	InterDomain Routing Protocol (ISO)
IDU	Interface Data Unit (UNI 3.0)
IE	Information Element
IEEE	Institute of Electrical and Electronical Engineers (genannt: "I triple E")
IETF	Internet Engineering Task Force
IG	Information Group
IGMP	Internet Group Management Protocol
IGP	Internal/Interior Gateway Protocol
IGRP	Interior Gateway Routing Protocol (Cisco)
IISP	Interim Inter-switch Signalling Protocol = Vorläufer von PNNI
ILMI	Interim Local Management Interface
IMA	Inverse Multiplexing for ATM
IMTC	International Multimedia Teleconferencing Consortium
IntServ	Integrated Services (IETF, vgl. DiffServ)
IP	Internet Protocol (connectionless-mode (inter)network service)
IPng	IP next Generation = IPv6 = IP Version 6
IPX	Internetwork Packet eXchange (=Übertrag.protokoll von Novell (-> SPX))
IS-IS	Intermediate System-to-Intermediate System
ISDN	Integrated Services Digital Network
ISL	Inter-Switch Link Protocol (Cisco)
ISLAN	Integrated Services LAN
ISO	International Standardization Organization
ISP	International Standardized Profile / Internet Service Provider
ISV	Independant Software Vendor
ITSEC	Information Technology Security Evaluation Criteria
ITU-TSS	International Telecommunications Union Telecom. Standardiz. Sector (formerly CCITT)
IWU	InterWorking Unit
IXC	Inter eXchange Carrier

J

JAMES Project	Joint ATM Experiment on European Services (20 european Telecoms)
JPEG	Joint Photographic Expert Group color image coding and compression bis 25:1

L

L2M	Layer2 Module (Siemens)
LAN	Local Area Network
LANE	LAN Emulation (ATM Forum)
LAPB	Link Access Procedure Balanced (X.25)
LAppQos	Legacy Application Quality of Service
LAT	Local Area Transport (DEC)
LBUBR	Load Balanced UBR
LCD	Loss of Cell Delineation
LCP	Link Control Protocol

LDAP	Light-weight Directory Access Protocol (VoIP)
LDP	Label Distribution Protocol
LE-ARP	LAN Emulation Address Resolution Protocol
LEC	LAN Emulation Client; Local Exchange Carrier
LECS	LAN Emulation Configuration Server
LED	Light Emitting Diode
LES	LAN Emulation Server
LGN	Logical Group Node
LI	Length Indication
LIS	Logical IP Subnet
LL-ID	Loopback Location IDentification
LLC	Logical Link Control
LLC/SNAP	Logical Link Control/Subnetwork Access Protocol
LMI	Logical Management Interface (Frame Relay, ATM)
LNNI	LANE Network-Network Interface (ATM Forum)
LOF	Loss of Frame
LOS	Loss of Signal
LQM	Link Quality Monitoring (PPP)
LQR	Link Quality Report
LSAP	Link Service Access Point
LSB	Least Significant Bit
LSP	Link State Protocol / Label Switched Path
LSR	Label Switching Router (vgl. MPLS)
LSS	Link Status Signal
LUNI	LAN Emulation UNI

M

MAC	Medium Access Control
MAN	Metropolitan Area Network
MAPDU	Management Application Protocol Data Unit
MARS	Multicast Address Resolution Server (IETF)
MAU	Medium Attachment Unit / Multistation Access Unit (auch: MSAU)
MAY Project	Multimedia Application on Intercontinental Highway (transatlantic ATM)
MBONE	Multicasting backBONE
MBS	Maximum Burst Size
MCDV	Maximum Cell Delay Variation
MCLR	Maximum Cell Loss Ratio
MCR	Minimum Cell Rate
MCTD	Maximum Cell Transfer Delay
MD-PDU	Management Data PDU
MD5	Message Digest algorithm
MGCP	Media Gateway Control Protocol (VoIP, IETF)
MIB	Management Information Base
MID	Multiplexing IDentification / Message IDentifier
MICE	Multimedia Integrated Conferencing for European Researchers
MIME	Multipurpose Internet Mail Extensions
MIPS	Mega Instructions Per Second

MLP	MultiLink PPP
MMF	MultiMode Fiber
MOCS	Managed Object Conformance Statement
MOM	Manager Of Managers
MOP	Meta Object Protocol
MOR	Multiwavelength Optical Repeater
MOSPF	Multicast OSPF
MPC	MPOA Client
MPEG	Motion Picture Expert Group (benötigt 10 Mbps)
MPLS	Kompression für Motion Video/Audio bis 7:1
MPOA	MultiProtocol Label Switching
MPS	MultiProtocol Over ATM (IETF)
Mpx	MPOA Server
MRU	MultiPleXer (CCITT I.324)
MSB	Maximum Receive Unit (PPP)
MSN	Most Significant Bit
MSOH	Multiple Subscriber Number
MSP	Multiplexer Section OverHead
MTA	Multicast Synchronization Protocol
MTU	Message Transfer Agent
MUX	Maximum Transmission/Transfer Unit
MX-RR	MULTipleXor (CCITT I.113)
	Mail eXchange Resource Record

N

NAS	Network Attached Storages
NBMA	Non Broadcast Multiple Access
NCP	Network Control Protocol
NCSA	National Center for Supercomputing Applications (University of Illinois at Urbana Champaign)
NDIS	Network Driver Interface Specification (Microsoft, HP, 3COM, IBM)
NDS	Netware Directory Service
NETBIOS	NETwork Basic Input/Output System
NetWare	distributed filesystem von Novell
NFS	Network File System (SUN distributed filesystem protocol)
NHC	Next Hop Client (NHPR)
NHRP	Next Hop Resolution Protocol (IETF)
NIC	National Information Centre / Network Information Center
NIS	Network Information System
NIU	Network Interface Unit (segmentation, reassembly)
NLM	Netware Loadable Module (= Netware Versionengruppe3; vgl. VAP)
NLSP	NetWare Link State Protocol
NMF	Network Management Forum
NML	Native Mode LAN
NNI	Network-to-Network/Node Interface (Switch)
NNTP	Network News Transfer Protocol
NOC	Network Operation Center
NOS	Network Operating System
NP	Network Performance
NPC	Network Parameter / Policing Control
NPM	Network Processor Module (Cisco 4500)
NRM	Network Resource Management

NSAP	Network Service Access Point
NSC	National Support Center
NSF	National Science Foundation
NT	Network Termination (Referenzpunkte: TB an B-NT1, SB an B-NT2)
NTP	Network Termination Point / Network Time Protocol
NVP	Nominal Velocity of Propagation

O

AODM	Optical Add-Drop Multiplexer
OAM	Operation, Administration and Maintenance
OC-n	Optical Carrier level n (= ITU-T Standard) (vgl. STSn = SONET Standard)
ODA	Office (or Open) Document Architecture
ODI	Open Data link Interface (Novell)
ODIF	Office Document Interchange Format
ODLI	Open Data Link Interface (Novell)
OEM	Original Equipment Manufacturer (vgl. VAR)
OIM	OSI Internet Management
OME	Object Management Edge (AIMS)
OMG	Object Management Group
OMNIPoint	Open Management Interoperability Point (ausgewählte Standardprofile der NMF)
ONC	Open Network Computing
OOA	Object Oriented Analysis
OOD	Object Oriented Design
OOP	Object Oriented Programming
ORB	Object Request Broker (OMG)
OSF	Open Software Foundation
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First
OSS	Operation Support System
OTDM	Optical Time Division Multiplex
OUI	Organizationally Unique Identifier (IEEE)
OXC	Optical CROSS Connect

P

PABX	Private Automatic Branch eXchange
PAM	Pulse Amplitude Modulation
PAP	Password Authentication Protocol (vgl. CHAP)
PAR	PNNI Augmented Routing
PBX	Private Branch eXchange (telephone switchboard on the user premises)
PCB	Protocol Control Block
PCI	Protocol Control Information
PCM	Pulse Code Modulation (64Kbps pro Kanal, vgl. ADPCM, CS-ACELP)
PCR	Peak Cell Rate
PDH	Plesiochronous Digital Hierarchy
PDU	Protocol/Packet Data Unit
PEM	Privacy Enhanced Mail
PG	Peer Group

PGL	Peer Group Leader
PGLE	Peer Group Leader Election
PGP	Pretty Good Privacy
PID	Protocol IDentifier
PING	Packet INternet Groper
PIM	Protocol Independant Multicast
PIR	Packet Insertion Rate
PL	Physical Layer
PLCP	Physical Layer Convergence Protocol / Procedure (IEEE-802.6: im MAN Pakete -> PDH, Mechanismus=DQDB (53Bytes), Transport-Protokoll: US=SMDS, Europe=CBDS)
PLIM	Physical Layer Interface Module
PLR	Packet Loss Rate
PM	Physical Medium
PMD	Physical layer Medium Dependent
PNNI	Private Network to Network Interface (vgl. IISP)
PNO	Public Network Operator
POH	Path OverHead (in SDH)
POS	Packet Over Sonet/SDH
POSIX	Portable Operating System for UNIX
POTS	Plain Old Telephone Service
PPD	Partial Packet Discard (s. EPD)
PPP	Point-to-Point Protocol (TCP/IP)
PRMD	PRivate Management Domain
PROM	Programmable ReadOnly Memory
PT	Payload Type
PTE	Path Terminating Equipment (SONET)
PTM	Packet Transfer Mode
PTO	Public Telecommunications Operator
PTSE	PNNI Topology State Elements
PTSP	PNNI Topology State Packets
PTT	Post, Telegraph and Telephone (company)
PVC	Permanent/Privat Virtual Circuit/Permanent Virtual Connection
PVCC	Permanent Virtual Channel Connection
PVPC	Permanent Virtual Path Connection
PWI	Public Windows Interface
PWS	Personal WorkStation

Q

Q3	CCITT TMN: Schnittstelle zwischen OS + Nutzelementen (NE)
Q3, Qx, X, F, G	CCITT: Standardized Interfaces in TMN networks
QCIF	Quarter Common Intermediate Format 176x144 pixel/frame, 30 frames/sec
QoS	Quality of Service

R

RACE	Research on Advanced Communications in Europe
RAIG	Resource Availability Information Group
RAM	Random Access Memory
RARE	Reseaux Associes pour la Recherche Europeenne
RC	Request Counter

RCC	Routing Control Channel
RDF	Rate Decrease Factor
RED	Random Early Detect / Discard
RESYNC-PDU	RESYNChronization PDU
RFC	Request For Comment (TCP/IP Standard-Dokument)
RIF	Routing Information Field; Rate Increase Factor
RIP	Routing Information Protocol
RIPE	Reseaux IP Europeenne
RIPE NCC	RIPE Network Coordination Center
RISC	Reduced Instruction Set Computer
RM	Resource Management
RMOA	Realtime Multimedia Over ATM
RMON	Remote MONitoring (Standard-MIB von SNMP)
ROM	Read-Only Memory
ROSE	Remote Operations Service Element
RPC	Remote Procedure Call (aus DCE)
RS	Regenerator Section
RSAK-PDU	ReSynchronization AcKnowledge PDU
RSCP	Routing Services Control Point
RSOH	Regenerator Section OverHead
RSVP	Resource reSerVation Protocol
RTMP	Routing Table Maintenance Protocol
RTP	Realtime Transport Protocol
RTCP	Real Time Control Protocol
RTSP	Real Time Streaming Protocol (VoIP, Multimedia)
RTTI	RunTime Type Identification (WWW)

S

SAA	System Application Architecture (IBM)
SAAL	Signalling ATM Adaptation Layer
SAC	Single Attached Concentrator (FDDI)
SAIN	Specification of ATM Interworking among Networks
SAN	Storage Area Networks
SAP	Service Access Point / Service Advertising Protocol
SAR	Segmentation and Reassembly sublayer (Schicht in AAL)
SAS	Single Attached Station (FDDI)
SB	Switching Block (Siemens)
SC	Subscriber Connector (Stecker-Typ) / Stick nad Click
SCP	Switch/System Control Processor
SCPA	Service Control Point Architecture
SCR	Sustainable/Sustained Cell Rate
SCSP	Server Cache Synchronization Protocol
SCTP	Stream Control Transmission Protocol (IETF)
SD-PDU	Sequenced Data PDU
SDH	Synchronous Digital Hierarchy (europ. CCITT Standard, vgl. STMx; entstanden aus amerik. SONET/STS _n /OC- _n)
SDI	Storage Device Interface
SDL	Specification Description Language
SDLC	Synchronous Data Link Control (Protokoll auf OSI Schicht2, vgl HDLC)
SDP	Session Description Protocol (VoIP)
SDP-PDU	Sequenced Data with Poll PDU
SDU	Service Data Unit
SFET	Synchronous Frequency Encoding Technique
SFI	System Format ID

SFMA	Specific Functional Management Areas
SGML	Standard Generalized Markup Language (WWW)
SIG	SMDS Interest Group
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol (VoIP)
SIPP	Simple Internet Protocol Plus (SIPP16 = 16 byte address)
SLIP	Serial Line Internet Protocol (in TCP/IP)
SLP	Service Location Protocol (VoIP, s. GLP)
SMDR	Storage Management Data Requester
SMDS	Switched Multimegabit Data Service (WAN-Dienst d. öff. Anbieter)
SME	Storage Management Engine
SMF	System Manager Facility / System Management Function / Simple Mode Fiber
SMFA	Specific Management Functional Areas
SMI	Structure of Management Information
SMS	Storage Management Service / Selective Multicast Service / Short Message Service
SMT	Synchronous Multiplex Terminal
SMTF	Simple Mail Transfer Protocol
SNA	Systems Network Architecture (IBM)
SNAP	SubNetwork Access Point / Area Protocol
SNMP	Simple Network Management Protocol (IETF)
SPANS	Simple Protocol for ATM Network Signalling (FORE proprietary)
SOH	Section OverHead (in SDH)
SONET	Synchronous Optical NETwork (vgl. STSn/OC-n, SDH/STMx) aus dem amerik. SONET ist 1988 der europ. CCITT-Standard SDH entstanden)
SPANS	Simple Protocol for ATM Network Signaling (FORE)
SPE	Synchronous Payload Envelope
SPF	Shortest Path First
SPVC	Soft Permanent Virtual Connection
SPVP	Soft Permanent Virtual Path
SPX	Sequenced Packet eXchange (=Übertrag.protokoll von Novell (->IPX)
SRP	Spatial Reuse Protocol (media independent MAC layer protocol)
SRTS	Synchronous Residual Time-Stamp
SSAP	Source Service Access Point
SSCF	Service Specific Coordination Function
SSCOP	Service Specific Connection Oriented Protocol
SSCP	Systems Services Control Point
SSCS	Service Specific Convergence Sublayer
SSL	Secure Socket Layer (verschlüsseltes Transportprotokoll)
SSRP	Server to Server Redundancy Protocol (Cisco)
SSS	Self Synchronizing Scrambler (Kodierverf mit Polynom X43+1, vgl. DSS)
ST	Segment Type / Straight Tip (Stecker-Typ) / Stick and Turn
ST-II	STream protocol version II
STDm	Synchronous Time Division Multiplexing (vgl. ATD, TDM)
STM	Synchronous Transfer Mode
STM1	155.520 Mbps = STS3/OC-3c
STM4	622.080 Mbps = STS12/OC-12
STMx	Synchronous Transport Module level x (Baustein der SDH)
STP	Shielded Twisted Pair / Spanning Tree Protocol

STS1	51.84Mbps = OC-1
STS3c	155Mbps = OC-3c = STM1 (c = concatenated)
STS12	622Mbps = OC-12 = STM4
STSn	Synchronous Transport Signal level n (Baustein von SONET Standard) = OC-n (ITU-T Standard)
SVC	Switched Virtual Circuit/Connection / Signalling Virtual Channel
SVCC	Switched Virtual Channel Connection
SVP	Switched Virtual Path

T

T1	Transmission link level1 = 1.544Mbps = DS1 in US
T3	Transmission link level3 = 44.736Mbps = DS3 in US
TA	Terminal Adapter (verbindet nicht-B-ISDN-fähige Geräte ans B-ISDN) / Transfer Agent
TAXI	Transparent Asynchronous Transmitter/Receiver Interface (100 Mbps)
TBE	Transit Buffer Exposure
TC	Transmission Convergence
TCB	TCP Control Block
TCP	Transmission Control Protocol (connection oriented transport service)
TCP/IP	Transmission Control Protocol/Internet Protocol (IETF)
TCRF	Transit Connection Related Function
TDM	Time Division Multiplexing (unterteilt in ATD und STD)
TDP	Tag Distribution Protocol
TE	Terminal Equipment (B-TE1 = B-ISDN fähig, B-TE2 = nicht fähig)
TEN-155	Trans European Network at 155 Mbps
TFTP	Trivial File Transfer Protocol (TCP/IP)
TIES	Telecom Information Exchange Services
TLV	Type, Length, Value
TMN	Telecommunication Management Network (ITU)
TP	Twisted Pair
TPD	Trailing Packet Discard (Vgl. EPD)
TPE	Transmission Path Endpoint
TRD	Transit Routing Domain
TSA	Target Service Agent
TTL	Time To Live
TTS	Trouble Ticket System
TU	Tributary Unit
TUG	Tributary Unit Group

U

UA	User Agent
UBR	Undefined Bit Rate (s. ABR, CBR, VBR)
UD-PDU	Unacknowledged Data PDU
UDP	User Datagram Protocol (verbindungsloses Protokoll in TCP/IP)
ULIA	UpLink Information Attribute
UME	UNI Management Entity
UMTS	Universal Mobile Telecommunications System
UNI	User-to-Network/Node Interface (Endgerät, Desktop)

UNIX	Uniplexed Information and Computing System
UNMA	Unified Network Management Architecture
UPC	Usage Parameter Control / User Policing Control
URC	Uniform Resource Citation (WWW)
URI	Universal Resource Identifier (WWW)
URL	Uniform/Universal Resource Locator (WWW)
URN	Uniform Resource Name (WWW)
USENET	USERS' NETwork; öffentliches Netz mit Knoten zum Internet, für News
USIM	UMTS Subscriber Identity Module
USTAT-PDU	Unsolicited Receiver State PDU
USV	Unterbrechungsfreie Stromversorgung
UTP	Unshielded Twisted Pair
UTRA	Universal Telecommunication Radio Access
UUS	User-to-User Signalling

V

VAP	Value Added Process (=NetWare Versionengruppe 2; vgl NLM)
VAR	Value Added Reseller (vgl OEM)
VAT	Visual Audio Tool
VBN	Visual Basic Network (= German Telekom Broadband Network)
VBNS	Very high speed Backbone Network Service
VBR	Variable Bit Rate (s. ABR, CBR, UBR)
VBS	Verteilte Betriebssysteme
VC	Virtual Circuit
VCC/I	Virtual Channel Connection/Identifier (=8 bits)
VCFC	Virtual Circuit Flow Control
VCL	Virtual Channel Link
VCR	Video Cassette Recorder
VF	Variance Factor
VHE	Virtual Home Environment
VIC	Video Conferencing
VLAN	Virtual LAN
VLSI	Very Large Scale Integration
VoD	Video on Demand
VOFDM	Vector Orthogonal Frequency Division Multiplexing (Daten-, Sprach- u. Videokommunikation per Funk)
VOP	Video Object Plane
VPC/I	Virtual Path Connection/Identifier (=16 bits)
VPL	Virtual Path Link
VPML	Virtual Reality Modeling Language
VPN	Virtual Private Network
VPT	Virtual Path Terminator (UNI 3.0)
VRML	Virtual Reality Modeling Language
VRRP	Virtual Router Redundancy Protocol
VSAT	Very Small Aperture Terminal
VTOA	Voice & Telephony Over ATM
VTP	VLAN Trunk Protocol (Cisco)

W

WAIS	Wide Area Information Server
------	------------------------------

WAN
WAP
WBEM
WDM
WFQ
WIN
WINS
WORM
WRED
WRR
WWW

Wide Area Network
Wireless Application /Access Protocol
Web Based Enterprise Management
Wavelength Division Multiplexing
Weighted Fair Queuing
WissenschaftsNetz
Windows Internet Name Service
Write Once Read Many
Weighted Random Early Detection (Cisco)
Weighted Round Robin
World Wide Web

X

X
XDR
XMP
XNS
XPG
XOM

CCITT TMN: Schnittstelle zu anderen
Managementsystemen
eXternal Data Representation
X/open Management Protocol
(Nachrichtenaustauschprotokolle)
Xerox Network Systems
X/open Portability Guide
X/open OSI-abstract data Manipulation

APPENDIX C

LIST OF TABLES

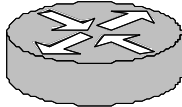
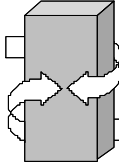
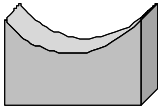
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1.0	Spreadsheet	Sec. I, 1.2.4, pg. 6
2.0	Filename Extensions	Sec. I, 1.3.5, pg. 7
3.0	Scale Factors	Sec. I, 1.3.5, pg. 7
4.0	Text Sizes	Sec. I, 1.3.5, pg. 8
5.0	Standard Sheet Sizes	Sec. I, 1.4, pg. 8
6.0	Leveling Scheme	Sec. IV, 4.3, pgs. 14-15

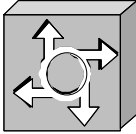
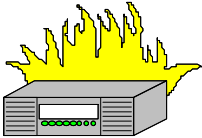
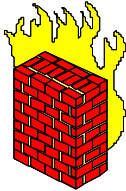
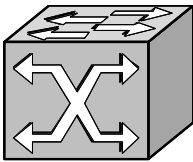
APPENDIX D

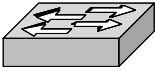

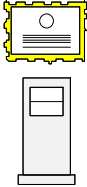
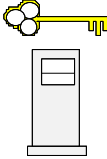
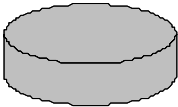

STANDARD LOGICAL DIAGRAM SYMBOLS


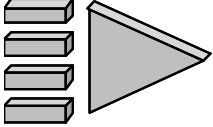

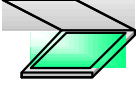

The following symbols will be used to represent the appropriate equipment when developing a logical network diagram. The Logical Diagram will be used to express a design, idea or concept prior to the identification of specific equipment necessary to complete the design.

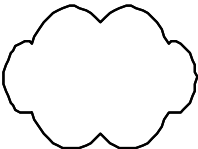
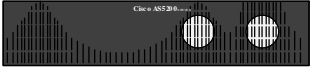
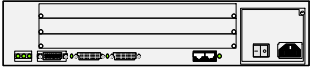



Starting from the network border and working inside the acceptable standards are:







Device	Symbol	Required Information
1.0 Router		Identify all interfaces as Serial or Ethernet, including fast Ethernet or Gigabit i.e., s and e
2.0 Gateway		Identify input protocol(s) and output(s) protocol as well as associated speeds.
3.0 Bridge		Identify remote (R) or local (L) and link speeds. Indicate if any compression is employed.


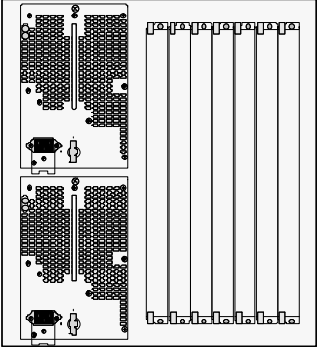
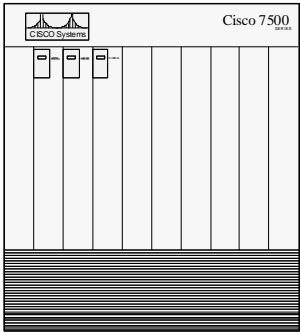
<p>4.0 Communications Server</p>		<p>Identify communication connections and channels availability. (PRI or racked modems)</p>
<p>5.0 Appliance Firewall</p>		<p>Identify make and model (Cisco PIX or NOKIA). Indicate network segments including DMZ(s) and Service Network(s).</p>
<p>6.0 Firewall</p>		<p>Indicate system (SUN, HP, IBM), Operating System (UNIX, NT) and Firewall Software (Checkpoint, AXENT, etc.) Indicate network segments including DMZ(s) and Service Network(s).</p>
<p>7.0 Main Switch</p>		<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>

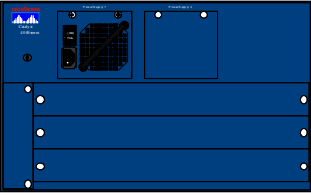

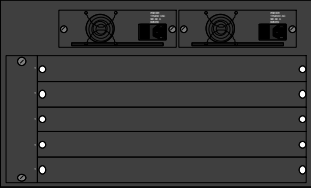

<p>8.0 Workgroup Switch (fan-out)</p>		<p>Indicate model, number of ports required, speed of ports (including uplink ports) and if SNMP or RMON management is included.</p>
<p>9.0 Hub</p>		<p>Indicate model, number of ports required, Hub speed (10 or 100 Mbps), presence and speed of uplink ports, and if SNMP or RMON management is included.</p>
<p>10.0 Certificate Server</p>		<p>Indicate make and model, number of certificates supported and network connection speed required.</p>
<p>11.0 PKI Server</p>		<p>Indicate make and model, number of tokens supported and network connection speed required.</p>
<p>12.0 Database</p>		<p>Indicate type and vendor (SQL by Oracle, SQL by Microsoft, Flatfile by IBM); and approximate size.</p>
<p>13.0 Server</p>		<p>Indicate make, model, and configuration.</p>

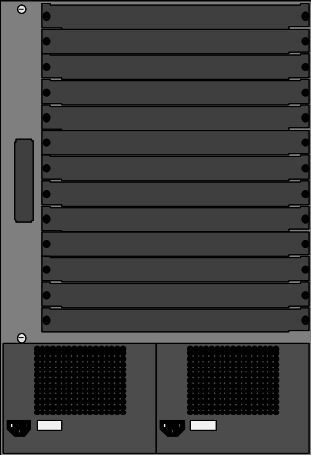
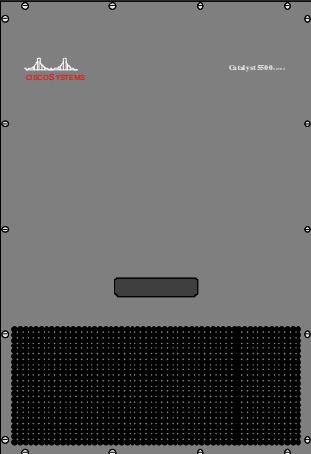
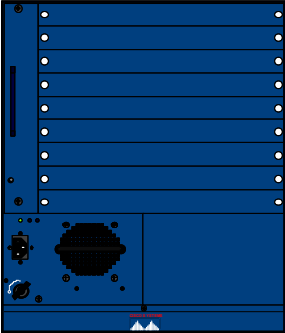
<p>14.0 Workstation</p>	 Workstation	<p>Indicate make, model, and configuration.</p>
<p>15.0 Terminal Server</p>		<p>Indicate number of terminals supported and interface configuration.</p>
<p>16.0 Terminal</p>		<p>Indicate make, model, and configuration.</p>
<p>17.0 Scanner</p>	 Scanner	<p>Indicate make, model, and configuration (memory and network capability).</p>
<p>18.0 Printer</p>	 Printer	<p>Indicate make, model, and configuration (memory and network capability).</p>

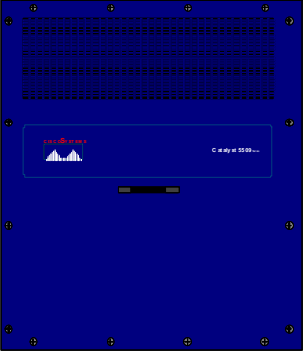
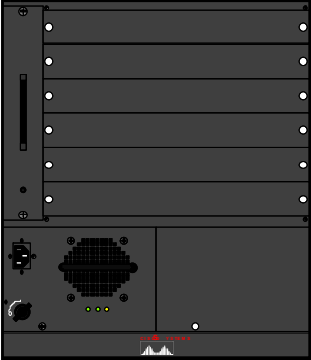
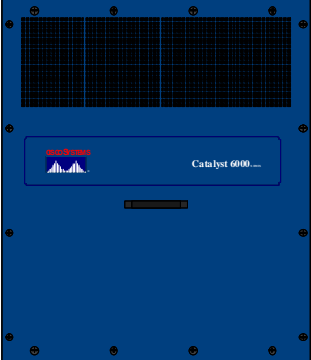
<p>19.0 Network Cloud</p>		<p>Indicate cloud or interface provider (Sprint, MCI, AT&T) and interface speeds.</p>
<p>20.0 Access Server</p>	 <p>Cisco Systems AS5200 (F)</p>	<p>Indicate make and model, number of PRI lines supported and network connection speed required.</p>
<p>21.0 Access Server</p>	 <p>Cisco Systems AS5200 (R)</p>	<p>Indicate make and model, number of PRI lines supported and network connection speed required.</p>
<p>22.0 Firewall</p>	 <p>Cisco Systems PIX Firewall</p>	<p>Indicate network segments including DMZ(s) and Service Network(s).</p>
<p>23.0 Router</p>	 <p>Cisco Systems 2501</p>	<p>Indicate IP numbers and serial service.</p>
<p>24.0 Router</p>	 <p>Cisco Systems 2502</p>	<p>Indicate IP numbers and serial service.</p>

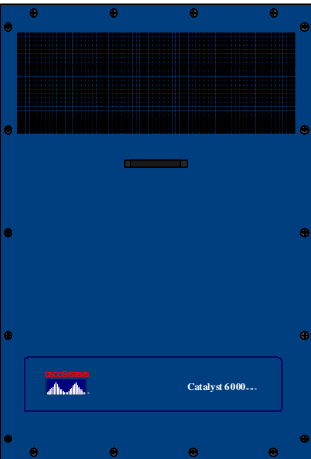
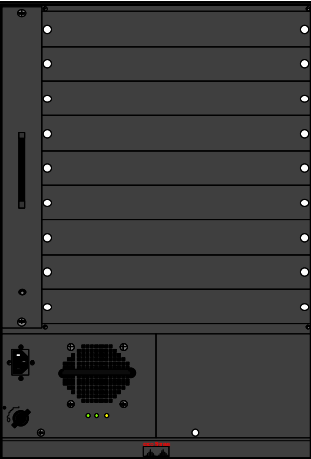

<p>25.0 Router</p>	 <p>Cisco Systems 2503</p>	<p>Indicate IP numbers and serial service.</p>
<p>26.0 Router</p>	 <p>Cisco Systems 2504</p>	<p>Indicate IP numbers and serial service.</p>
<p>27.0 Router</p>	 <p>Cisco Systems 2505</p>	<p>Indicate IP numbers and serial service.</p>
<p>28.0 Router</p>	 <p>Cisco Systems 2507</p>	<p>Indicate IP numbers and serial service.</p>
<p>29.0 Router</p>	 <p>Cisco Systems 2513</p>	<p>Indicate IP numbers and serial service.</p>
<p>30.0 Router</p>	 <p>Cisco Systems 2514</p>	<p>Indicate IP numbers and serial service.</p>

<p>31.0 Router</p>	 <p>Cisco Systems 2515</p>	<p>Indicate IP numbers and serial service.</p>
<p>32.0 Router</p>	 <p>Cisco Systems 7507 (R)</p>	<p>Indicate IP numbers and serial service.</p>
<p>33.0 Router</p>	 <p>Cisco Systems 7507 (F)</p>	<p>Indicate IP numbers and serial service.</p>

<p>34.0 Router</p>	 <p>Cisco Systems 4000 (R)</p>	<p>Indicate IP numbers and serial service</p>
<p>35.0 Switch</p>	 <p>Cisco Systems Catalyst 5000 (F)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>
<p>36.0 Switch</p>	 <p>Cisco Systems Catalyst 5000 (R)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>
<p>37.0 Switch</p>	 <p>Cisco Systems WS-C3524-XL</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>

<p>38.0 Switch</p>	 <p>Cisco Systems Catalyst 5500 (R)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>
<p>39.0 Switch</p>	 <p>Cisco Systems Catalyst 5500 (F)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>
<p>40.0 Switch</p>	 <p>Cisco Systems Catalyst 5509 (R)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>

<p>41.0 Switch</p>	 <p>Cisco Systems Catalyst 5509 (F)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>
<p>42.0 Switch</p>	 <p>Cisco Systems Catalyst 6006 (R)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>
<p>43.0 Switch</p>	 <p>Cisco Systems Catalyst 6006 (F)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>

<p>44.0 Switch</p>	 <p>Cisco Systems Catalyst 6009 (F)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>
<p>45.0 Switch</p>	 <p>Cisco Systems Catalyst 6009 (R)</p>	<p>Indicate model, number of ports required, type and speed of ports i.e., 100 Mbps ST fiber (including uplink ports) and if SNMP or RMON management is included.</p>
<p>46.0 Switch</p>	 <p>Cisco Systems Catalyst 1900</p>	<p>No special information Required.</p>

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Note:

To be developed upon completion of manual.