Chapter 1 Networking Fundamentals

This chapter provides an overview of basic networking concepts, including network architecture, design, and project management.

Table of Contents

Introduction to Networking Fundamentals 1-1

Overview 1-1

Networking History and Evolution 1-2

Overview 1-2
Mainframe Terminals 1-3
Minicomputer Terminals 1-4
Personal Computing Devices 1-5

Open Systems Interconnection (OSI) Reference Model 1-6

Overview 1-6
Layers 1-6
Layer 7 (Application) Services 1-9
Layer 6 (Presentation) Services 1-9
Layer 5 (Session) Services 1-9
Layer 4 (Transport) Services 1-9
Layer 3 (Network) Services 1-9
Layer 2 (Data Link) Services 1-9
Layer 1 (Physical) Services 1-9
Message Transfer Sequence 1-10

Introduction to Network Architecture and Design 1-17

Overview 1-17
Types of Networks 1-19
Personal Area Networks (PANs) 1-19
Local Area Networks (LANs) 1-20
Campus Area Networks (CANs) 1-21
Metropolitan Area Networks (MANs) 1-22
Wide Area Networks (WANs) 1-23
Types of Messaging 1-24
Unicast Messaging 1-24
Broadcast Messaging 1-27
Multicast Messaging 1-28

Types of Addressing 1-29
Local Area Network (LAN) Addressing 1-29
Internetwork Addressing 1-30
Message Transfer Using Addressing 1-33
Network Architecture Standards 1-38
IEEE Standards 1-38
Internet Engineering Task Force (IETF) Standards 1-40
Network Design 1-41
Functional Design Process 1-41
Physical Design Process 1-42

Project Management 1-43

Overview 1-43
Human Resources Management 1-44
Scope Management 1-44
Integration Management 1-44
Time Management 1-44
Cost Management 1-44
Quality Management 1-44
Communications Management 1-45
Risk Management 1-45
Procurement Management 1-45

Specifications Writing 1-46

Overview 1-46
MasterFormat™ 2004—Numbering Revision 1-47
MasterFormat™ 2004 Division Number Changes Affecting Information Transport 1-49

References 1-50

 © 2009 BICSI®

Figures

Figure 1.1 Mainframe environment 1-3
Figure 1.2 Minicomputer environment 1-4
Figure 1.3 Personal computing devices 1-5
Figure 1.4 Open Systems Interconnection Reference Model 1-6
Figure 1.5 Message transfer described using the Open Systems Interconnection Reference Model 1-8
Figure 1.6 Personal area network 1-19
Figure 1.7 Local area network 1-20
Figure 1.8 Campus area network 1-21
Figure 1.9 Metropolitan area network 1-22
Figure 1.10 Wide area network 1-23
Figure 1.11 Unicast messaging 1-25
Figure 1.12 Replicated unicast messaging 1-26
Figure 1.13 Broadcast messaging 1-27
Figure 1.14 Multicast messaging 1-28
Figure 1.15 Example of a local area network 1-29
Figure 1.16 Example of an internetwork 1-31
Figure 1.17 Relationship between an Internet protocol datagram and an Ethernet frame 1-34
Figure 1.18 Internetwork message transfer 1-35
Figure 1.19 Creating a new broadcast domain 1-37
Figure 1.20 Functional (top-down) design 1-41
Figure 1.21 Physical (bottom-up) design 1-42
Figure 1.22 Project management knowledge areas 1-43

Table

Table 1.1 MasterFormat™ 2004—numbering revision 1-47

Examples

Example 1.1 Message output at the sending system 1-10
Example 1.2 Message input at the receiving system 1-14

Click here to download full PDF material