

# CHAPTER 1 INTRODUCTION

## ANSWERS TO QUESTIONS

**1.1** (1) Networks make it easier to manage geographically dispersed operating locations. (2) They also help organizations deliver information to workers in a timely manner, including anytime-anywhere on a mobile device if necessary. (3) Networks improve communication and information management within and between business organizations. Good networks bring business partners closer together in ways that improve efficiency, customer service, agility, and innovation.

**1.2** Communication traffic, both local (within a building or business campus) and long distance, has been growing at a high and steady rate for decades. Network traffic is no longer limited to voice and data and increasingly includes image and video. Increasing business emphasis on web services, remote access, online transactions, and social networking means that this trend is likely to continue.

As businesses rely more and more on information technology, the range of services that business users desire to consume is expanding. For example, mobile broadband traffic growth is exploding as is the amount of data being pushed over mobile networks by business users' smart phones and tablets. In addition, over time, mobile users are increasingly demanding high quality services to support their high resolution camera phones, favorite video streams and high-end audio.

Four technology trends are particularly notable:

- (1) The trend toward faster and cheaper, both in computing and communications, continues.
- (2) Today's networks are more "intelligent" than ever.
- (3) The Internet, the Web, and associated applications have emerged as dominant features for both business and personal network landscapes.
- (4) While there has been a trend toward mobility for decades, the mobility explosion has occurred and has liberated workers from the confines of the physical enterprise.

**1.3** Convergence refers to the merger of previously distinct telephony and information technologies and markets. The benefits include:

- (1) cost savings, through reduction in network management costs and through better use of existing resources;

- (2) effectiveness, allowing companies to employ a more mobile workforce;
- (3) transformation: converged IP networks can easily adapt to new functions and features as they become available through technological advancements without having to install new infrastructure.

**1.4** A concept related to that of convergence is unified communications (UC). Whereas convergence focuses on the merger of fundamental voice, video, and data communications facilities and the resulting ability to support multimedia applications, UC focuses on the user perspective to the broad spectrum of business applications. Three major categories of benefits are typically realized by organizations that use UC:

- (1) personal productivity gains, through effective use of presence information;
- (2) workgroup performance gains, through real-time collaboration;
- (3) enterprise-level process improvements: IP convergence enables UC to be integrated with enterprise-wide and departmental-level applications, business processes, and workflows.

**1.5** Voice communications, data communications, image communications, and video communications are all found on networks.

**1.6** Optical fiber transmission has become more common because of its high capacity and security characteristics.

**1.7** Wireless transmission is becoming more common in business for much the same reason as it is for consumers: convenience and mobility.

**1.8** Distributed data processing has become more common because of the widespread use of PCs, laptops, and mobile computing devices, the deployment of wireless LANs, and the push to support mobile workers.

**1.9** Application software performs a specific function such as accounting while interconnection software ensures that all computers and terminals speak the same language and can be connected together.

**1.10** There are several key distinctions between LANs and WANs.

- (1) The geographic scope of the LAN is small, typically a single building or a cluster of buildings.
- (2) It is usually the case that switches and communication equipment used to implement the LAN are owned by the same organization that owns the LAN-attached computing devices. For WANs, this is less often the case, with all or at least a significant

- fraction of the WAN circuits and switching nodes are not owned by the business.
- (3) The internal data rates of LANs are typically much greater than those of WANs. MANs are closer to LANs than WANs in terms of these distinctions.

## ANSWERS TO PROBLEMS

- 1.1** Answers will vary. The grading rubric for the paper should ensure presence of acceptably accurate and complete definitions for each type of cloud services. The rubric should also include two or more examples of major providers for each cloud services category (e.g. for SaaS: Salesforce.com, NetSuite.com; for IaaS: Amazon EC2, OpSource, Rackspace; for PaaS: Amazon EC2, Google Apps, SAP).
- 1.2** Answers will vary. The grading rubric should ensure presence of acceptably accurate and complete URLs for at least three YouTube videos that focus on Unified Communications. It should also include sufficiently complete and compelling justification for the video selected as being best. It may include presence of rationale for why the other videos are not deemed to be the best.
- 1.3** Answers will vary. The grading rubric for the paper should ensure presence of acceptably complete descriptions of the business benefits derived by three or more organizations that have implemented UC. The rubric may include the presence of examples of benefits realized at personal, workgroup, and enterprise-wide levels.
- 1.4** Answers will vary. The grading rubric for the paper should ensure presence of acceptably complete descriptions of the business benefits derived by three or more organizations that have implemented IPTV and the business rationale underlying its implementation.
- 1.5** Answers will vary. The grading rubric for the paper should ensure presence of acceptably complete descriptions of Metro Ethernet and two or more MAN alternatives. The rubric may include the presence of both wireless and wired MAN alternatives.
- 1.6** Answers will vary. The rubric should include presence of two or more Web cam images including one for the student in the screenshots. It should also include at least one chat session window. It may require evidence of Skype or another well-known real time multimedia communication environment that combines voice, video, and chat.

# CHAPTER 2 BUSINESS INFORMATION

## ANSWERS TO QUESTIONS

- 2.1** A digital communication system uses a sequence of discrete, discontinuous values or symbols to represent information. Analog communication systems use a continuous signal to represent either continuous or discrete information sources; voltage may be used because it can take on a continuum of values to represent information.
- 2.2** Discrete information has a finite "alphabet." Examples include letters, numbers, icons, and binary data (which represent one of two states as "on or off," "yes or no," etc.). Continuous (analog) information sources include sounds, music, and video.
- 2.3** The audio signal's amplitude is sampled at a rate that is at least twice its maximum frequency. For voice of telephone quality, a sampling rate of 8000 samples per second is used. After sampling, the signal amplitudes are put in digital form, a process referred to as quantization. Eight bits per sample are usually used for telephone quality voice. The audio signal is considered "digitized" after each sample is converted to a fixed-length string of bits.
- 2.4** With **lossless compression**, receivers can reproduce an exact digital duplicate of the original data transmitted by the sender by expanding/decompressing the file that is received. When **lossy compression** is used, irreversible changes are made to original file that diminishes the quality of the original data when the receiver decompresses the file.
- 2.5** The **PBX** is an on-premises telephone switching facility. With a **hosted IP-PBX**, the switching, even between extensions in the same office, is done at the host's location. Another important difference is that voice over IP (VoIP) and other IP-based voice-oriented communication services is supported by an IP-PBX; an on-premises PBX may or may not support VoIP and IP-based voice communication services.