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Information Technology for Management

Advancing Sustainable, Profitable Business Growth



Chapter 4

Digital Networks and the Triple Bottom Line

ns. Inc.

Chapter Outline

- 1. Data Networks and API
- 2. Wireless and Mobile Infrastructure
- 3. <u>Messaging and Collaboration Technology</u>
- 4. Sustainability and Triple Bottom Line

1. Data Networks and API

- Network Fundamentals
 - Bandwidth: the capacity or throughput per second of a network measured in bits per second (bps).
 - Protocol: rules and standards that govern device functionality.
 - TCP/IP: Basic communication protocol of the Internet supported by every major network operating system.

- Network Fundamentals
 - Network Speed: data flowing that depends on the amount of traffic. Commonly referred to by generation (2G, 3G, etc.).
 - Data transferred over guided (wired) or unguided (wireless and mobile) media.
 - Application Program Interface (API) is the boundary where two separate systems meet.
 It provides standard ways to software, content, or websites to interact with each other

Figure 4.3 Network Bandwidth

Bandwidth is the communication capacity of a network.

Bandwidth is the amount of data that passes through a network connection over time as measured in **bits per second (bps)**.

Bandwidth is used in both directions—for uploads and downloads.

Very large data transfers reduce availability for everyone on the network. Network speed depends on amount of traffic. Data flows quickly and smoothly when traffic volume on the network is small relative to its capacity.

Growth in Mobile Network Traffic

Figure 2. Cisco Forecasts 30.6 Exabytes per Month of Mobile Data Traffic by 2020



Source: Cisco VNI Mobile, 2016

Four Drivers of Global Mobile Traffic



Figure 4.4 Four drivers of global mobile traffic through 2018.

- High Demand for High-Capacity Networks
 - Voice over IP (VoIP): voice calls (analog) converted to digital signals.
 - VoIP voice and data transmissions travel in packets over telephone wires.
 - Rely on 5 basic functions through switches and routers:
 - Communication
 - Mobility
 - Collaboration
 - Relationships
 - Search

Functions of Business Networks

Communication

Provides sufficient capacity for human and machine-generated transmissions. Delays are frustrating, such as when large video files pause during download waiting for the packets to arrive. **Buffering** means the network cannot handle the speed at which the video is being delivered and therefore stops to collect packets.

Search

Able to locate data, contracts, documents, spreadsheets, and other knowledge within an organization easily and efficiently.

Mobility

Provides secure, trusted, and reliable access from any mobile device anywhere at satisfactory download and upload speeds.

Relationships

Manages interaction with customers, supply chain partners, shareholders, employees, regulatory agencies, and so on.

Collaboration

Supports teamwork that may be synchronous or asynchronous; brainstorming; and knowledge and document sharing.

- Traffic Shaping and Quality of Service (QoS)
 - Latent-sensitivity: data such as real-time voice and high-quality video.
 - *Prioritized Traffic*: data and apps that are time-delay-sensitive or latency-sensitive apps.
 - *Throttle Traffic*: gives latency-sensitive apps priority, other types of traffic need to be held back (throttled).
 - *Traffic Shaping*: the ability to prioritize and throttle network traffic.

- Near-Field Communication (NFC)
 - Close proximity radio waves more secure than other wireless technologies
 - Apple iWatch
 - Digital tickets providing access to concerts
 - Kiosks to transmit moves in Supermarkets
 - Transmit public transport payment through phones

- Mashup
 - General term referring to the integration of two or more technologies such as Bluetooth and Wi-Fi
 - Provide intelligence
 - Inter-Automobile collision avoidance

- Application Program Interface (API)
 - Boundary where two separate systems meet.
 - Consists of a set of functions, commands, and protocols used by programmers for OSinteractivity without having to write a program from scratch.
 - Can be automated for simplified usability.
 - Twitter
 - Facebook
 - Amazon



Figure 4.8 API value chain in business.

- **1**. Why has IPv6 become increasingly important?
- 2. What is an IP address?
- 3. What are bandwidth and broadband?
- 4. Briefly described the basic network functions.
- 5. What is the difference between circuit switching and packet switching?
- 6. What is the difference between 3G and 4G?
- 7. What are the mobile network standards?
- 8. Define bandwidth and broadband.
- 9. Explain the Net neutrality debate.
- **10**. What are two applications of NFC?
- 11. What are the benefits of APIs?

2. Wireless and Mobile Infrastructure

Wireless Networks and Mobile Infrastructure

- Modern Mobile Communications
 - 2Mbps per mobile device by 2016
 - 66% of traffic through smartphones by 2018
 - Mobile traffic surpasses 2.5EB*/month by 2018
 - Greater than 15% all traffic through tablets by 2016
 - Greater than 50% mobile traffic is 4G by 2018

Wireless Networks and Mobile Infrastructure

- Mobile Networks
 - Bluetooth: short-range wireless communication technology allowing device pairing.
 - Wi-Fi: standard way to wirelessly connect computing devices through routers commonly connected to the Internet.

Overview of Wi-Fi



3 Router is connected to the Internet via a cable or DSL modem, or is connected via a satellite. **DSL** (Digital Subscriber Line) is a technology for bringing high- bandwidth information to homes and small businesses over ordinary copper telephone lines.

Wireless Networks and Mobile Infrastructure

- Factors to evaluate Mobile Networks solutions:
 - 1. Simple
 - 2. Connected
 - 3. Intelligent
 - 4. Trusted

- **1**. What factors are contributing to mobility?
- 2. Why is strategic planning of mobile networks important?
- 3. How does Wi-Fi work?
- 4. What factors should be considered when selecting a mobile network?

- Working in Modern Groups
 - Group workers can be located in different places or work at different times.
 - Group members may work for the same or different organizations.
 - Data, information, or knowledge may be located in many sources that may be external to the organization.
 - Create group dynamics group processes by design or default.

- Virtual Collaboration
 - Avoid travel expenses
 - Increase numbers of sessions
 - Record and store data in real-time
 - Streamline work processes, minimize information overload, generate new ideas, and boost innovation through online software.

- Virtual Collaboration Continued...
 - Improved retailer-supplier collaboration through web-based electronic data interchange (EDI).
 - Intranets provide inter-company data access, sharing, and collaboration through portals or gateways.
 - Extranets are private, company-owned networks remotely accessible via the Internet.
 - Online brainstorming through the Internet
 - Evernote
 - iMindmap Online

- Intranet
- Extranet
- Virtual Private Networks
 - Virtual tunnel routed through the Internet with software and hardware encryption.



- 1. Why is group work challenging?
- 2. What are the benefits of working in groups?
- 3. What might limit the use of in-person brainstorming?
- 4. How can online brainstorming tools overcome those limits?
- 5. What is the difference between an intranet and an extranet?
- 6. How does a virtual private network (VPN) provide security?

4. Sustainability and Triple Bottom Line

Sustainability and Triple Bottom Line

- Unsustainability
 - Profit-motivated without concern for damage to the environment contributing to climate change threatening quality of life.
 - Conduct that is unethical, socially irresponsible, and/or environmentally damaging.

Sustainability and Triple Bottom Line

- Global Warming
 - Upward trend in global mean temperature (GMT) rising more than 2°C since preindustrial times.
 - Damages include water and food scarcity, rising sea levels, and greater incidence and severity of disease.
- Sustainability
 - Reduce
 - Reuse
 - Recycle
 - Recover

4 R's of Environmental Sustainability



Recommended Action for IT Sector

SMART 2020 Report – substitute digital for physical formats:

- Telework
- Videoconferencing
- E-paper
- Mobile
- E-commerce

Triple Bottom Line

Triple bottom line (TBL or **3BL)** is an accounting framework with three parts:

- Social,
- Environmental (or ecological) and
- Financial.

The term was coined by John Elkington in 1994

Triple Bottom Line



Climate Change Corrective Action

Enabling home working and using video conferencing and e-commerce to reduce travel.

Reducing barriers to the use of public transport and improving people's experience of the journey. For example, smart ticketing and free Wi-Fi.

Facilitating car sharing and eco-driving.

Encouraging and enforcing speed limits by using average speed cameras and intelligent speed adaptation, which help drivers to avoid fines and stay safe.

Sustainability

- Sustainability Through Climate Change Mitigation – any action to limit the magnitude of long-term climate change.
- Mobile, cloud, and social carbon footprints

Ethical Considerations of Hyperconnected Humans

• Challenges of connected life?

Ethical Considerations of Hyperconnected Humans

Challenges of hyper-connection

- Borderline obsession
- Disconnect anxiety
- Feeling of disorientation and nervousness
- Text neck
- Game back
- Text claw
- Sleep texting
- Phantom phone vibration
- Internet addiction

Additions and Life Out of Control

Report Looking Further with Ford – 2014 Trends:

- Micro moments every moment is filled with something, we need downtime.
- Myth of Multitasking quality and safety questions
- Vying for validations
- Sustainability

Sustainability and Triple Bottom Line

- 1. Why do some experts warn that carbon emission reductions between 50 percent and 85 percent are necessary by 2050?
- 2. What contributes to the rise of global mean temperature?
- 3. What is the greenhouse effect?
- 4. How does the use of mobile devices contribute to the level of greenhouse gases?
- 5. What is ICT's role in global warming?
- 6. Why is global warming hotly debated?
- 7. Explain the goal of sustainability.
- 8. Explain the characteristics of a life out of control.