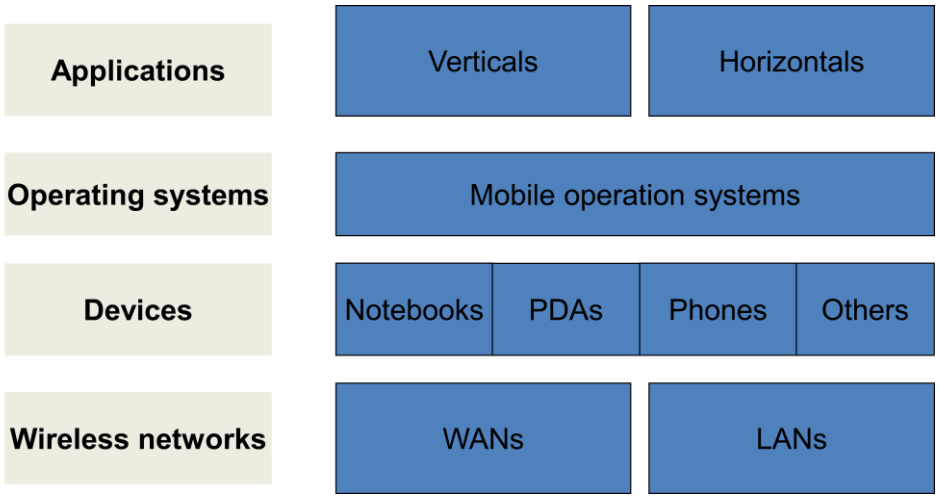
Mobile Computing Applications

- **Mobile Computing Chart**



- **Application Layer**
    - Vertical applications: those applied to a function part of an industry such as field sales and field service, or to specific market segment such as banking or health care.
    - Horizontal applications: those applied to many people across most market segments.
- **Operation Systems Layer**
    - This layer provides tools for application programmers to access different mobile devices and different wireless networks.
    - A key layer to rapid growth of wireless networking and proliferation of applications.
- **Device Layer**
    - All the mobile devices we carry with us:
        - Notebooks (NBs).
        - Personal Digital Assistants (PDAs).
        - Cellular phones.
        - Personal communicators.
        - Combination devices.
- **Wireless Networks Layer**
    - The Wireless Wide Area Network (WAN) is also called "Mobile Data" including:
        - Packet networks: RAM/Mobitex, ARDIS/Modacom.
        - Paging networks.

- Data over cellular: CDPD (over AMPS), GPRS (over GSM).
- Data over satellite.

- Wireless LANs: with much higher rate but smaller coverage than Mobile Data networks

Applications

- **Transportation Application**
  - Including:
    - Automatically locating the vehicle.
    - Transmission of news, road condition, weather …
    - Position via GPS.
    - Dispatching the vehicle to the next job.
    - Routing the vehicle if required.
    - Capturing data from the vehicle.
- **Personal Communications Application**
    - Messaging.
    - Calendaring.
    - Directories.
    - Info Systems.
    - Fax, etc.
- **Mobile Office Application**
    - Fax.
    - E-mail.
    - LAN access.
    - File transfer.
    - Database access.
- **Vertical Market Examples**
    - Airlines
    - Police
    - Field sales
    - Emergency
    - Stock exchanges
    - Hospitals
    - Maintenance
    - Retail stores
    - Casinos
    - Hotel
    - Taxicabs
    - Rental car agencies
    - Transportation

1.Vehicles.
2.Medical &Emergencies.
3.Business.
4.Replacement of Wired networks.
5.Infotainment.
6.Location dependent services.
  a) Follow on services.
  b) Location aware services.
  c) Privacy.
  d) Information services.

Horizontal Applications

Horizontal applications have broad-based appeal and include software that performs functions such as: (a) email; (b) Web browsing; (c) word processing; (d) scheduling; (e) contact management; (f) to-do lists; (g) messaging; (h) presentation. These types of applications usually come standard on Palmtops, Clamshells, and laptops with systems software such as Windows.

Horizontal Application Examples

- Near term horizontal applications (LAN app.)
  - Dynamic work environment
    - Trade show
    - conference
  - Difficult to wire areas
  - New employees who need immediate service
- Broad-based horizontal applications (WAN app.)
  - Wireless meeting
  - Wireless traveler
  - Interactive TV

Vertical Applications

Vertical applications are industry-specific and only have appeal within the specific industry for which the application was written. Vertical applications are commonly used in industries such as: (a) retailing; (b) utilities; (c) warehousing; (d) shipping; (e) medical; and (f) law enforcement and public safety. These vertical applications are often transaction oriented and normally interface with a corporate database.

Future of Mobile Computing

Some features of future mobile computing devices:-

- Use of Artificial Intelligence.
- Hardware
  - Lighter, Smaller, Energy management, User interface Integrated Circuitry -> Compact Size, Increases in Computer Processor speeds.
- High bandwidth facility.
- Improved radio technology & antennas.
- Core network convergence
  - IP-based, quality of service, mobile IP.
- Simple & open service platform
  - Intelligence at the edge (user), not in the network
  - More service providers for users, not network operator only.
- etc.....

Future Mobile Computing Devices (Concepts)

Laptop

Camera

SmartPhone

Tablet PC

PDA

Wearable watch

Characteristics of Mobile computing

– **Mobile devices**
  - Laptops
  - Palmtops
  - Smart cell phones

– **Requirements**
  - Data access:
    – Anywhere
    – Anytime
  - Nomadic users

– **Constraints**
  - Limited resources
  - Variable connectivity:
    – Performance
    – Reliability

1. Ubiquity

Ability of a user to perform computations from anywhere and at any time.

2. Location Awareness

Can provide information about the current location of a user to a tracking station. GPS

3. Adaptation

Implies the ability of a system to adjust bandwidth fluctuation without inconveniencing the user.

4. Broadcast

Efficient delivery of data can be made simultaneously to hand reads of mobile users.

5. Personalization

Services in a mobile environment can be easily personalized according to a user's profile.

6. Portability

The Ability to move a device within a learning environment or to different environments with ease.

7. Social Interactivity

The ability to share data and collaboration between users.

8. Context Sensitivity

The ability to gather and respond to real or simulated data unique to a current location, environment, or time.

9. Connectivity

The ability to be digitally connected for the purpose of communication of data in any environment.

10. Individual

The ability to use the technology to provide scaffolding on difficult activities and lesson customization for individual learners.

11. Small Size

Mobile devices are also known as handhelds, palmtops and smart phones due to their roughly phone-like dimensions. A typical mobile device will fit in the average adult's hand or pocket.

12. Wireless Communication

Mobile devices are typically capable of communication with other similar devices, with stationary computers and systems, with networks and portable phones.

Mobile Computing Functions

We can define a computing environment as mobile if it supports one or more of the following characteristics:

- **User Mobility.**
- **Network Mobility.**
- **Device Mobility.**
- **Service Mobility.**
- **Bearer Mobility.**
- **Session Mobility.**
- **Host Mobility (client –server, ip).**

Issues in Mobile Computing

- Software Issues - Apps.
- Technical Issues - Battery, h/w.
- Network Issues - connection.
- User Interface Issues - understanding.
- Security Issues - attacks.