

MOBILE COMPUTING

EGCO342 INFORMATION TECHNOLOGY IN DAILY LIFE



KANAT POOLSAWASD
DEPARTMENT OF COMPUTER ENGINEERING
MAHIDOL UNIVERSITY

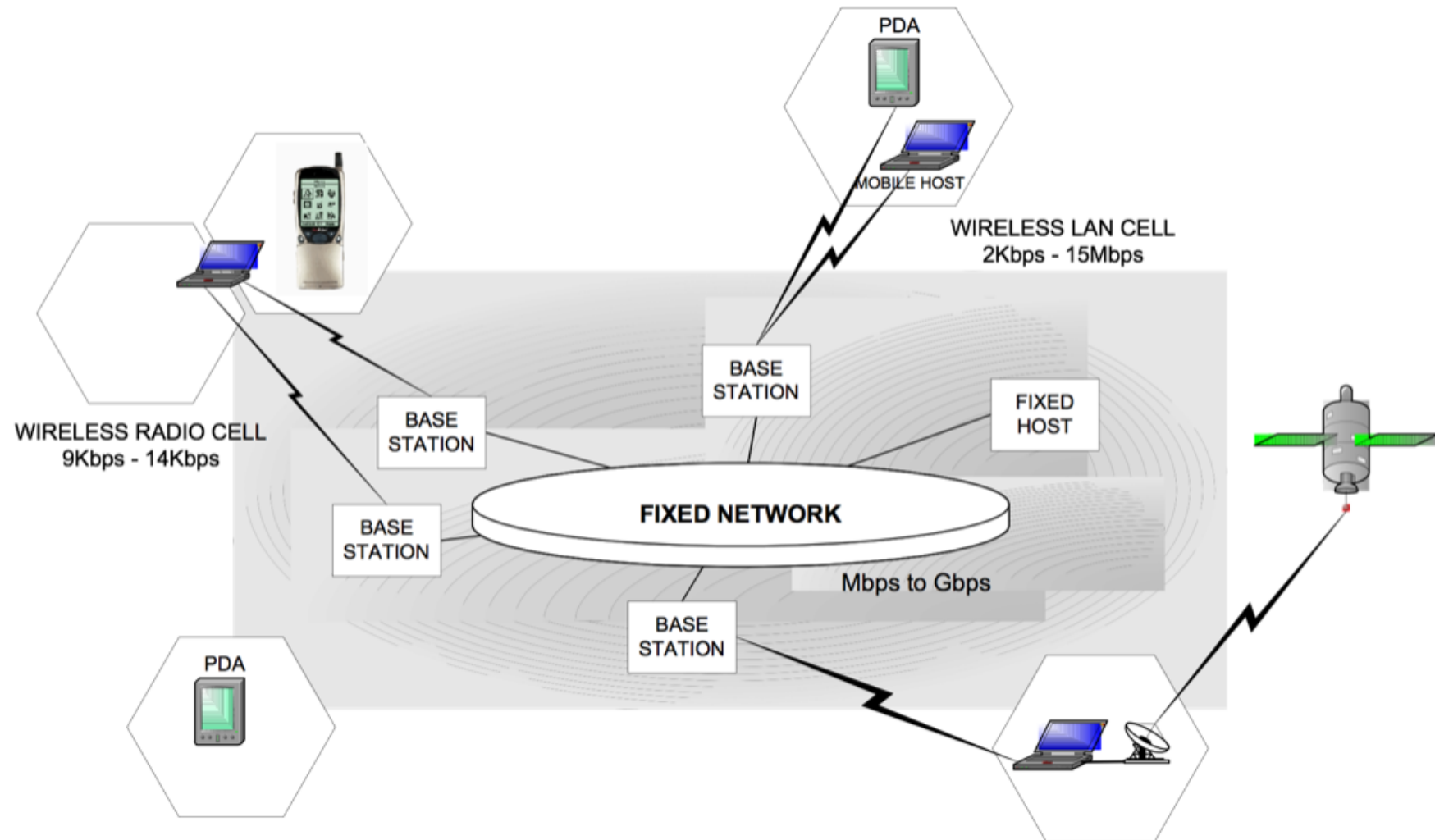
Wireless Mobile or Mobile Wireless ?

- Wireless communication systems is type of communication system.
- Dimensions of mobility:
 - The set of properties that distinguishes the mobile computing system from stationary computing system

Wireless & Cellular Communication

- Transmitting voice, data, video and other services data using electromagnetic waves in open space (atmosphere).
- Cellular communication:
 - Wireless communication using unguided media, that is, radio and microwave frequencies or satellites, has found widespread use in mobile phones.

Mobile Network Architecture



Wireless Characteristics

- Variant Connectivity
 - Low bandwidth and reliability
- Frequent disconnections
 - Sudden
- Asymmetric Communication
 - Broadcast medium
- Monetarily expensive
 - Charges per connection or per message/packet
- Connectivity is weak, Intermittent and Expensive

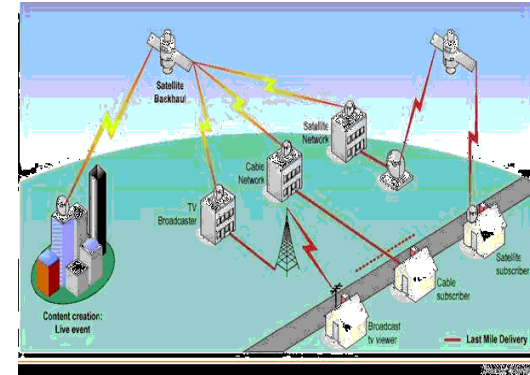
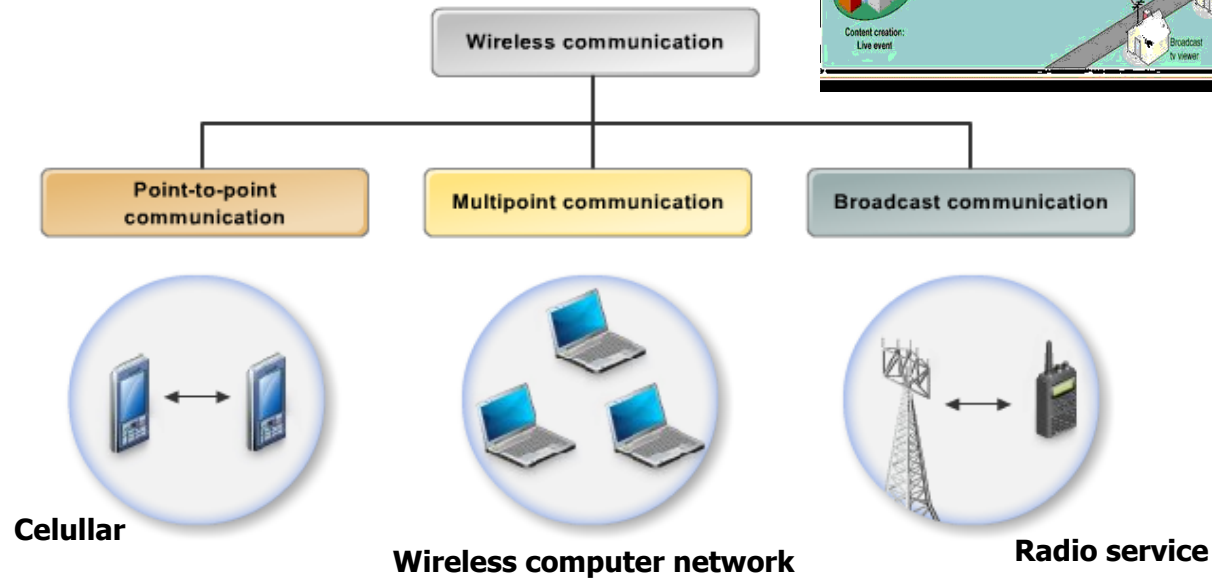
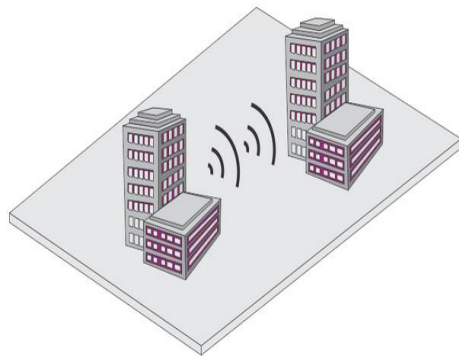
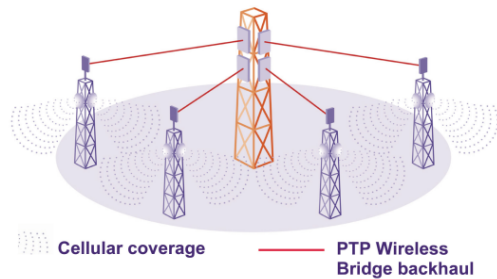
Mobility Characteristics

- Location changes
 - Location management - cost to locate is added to communication
- Heterogeneity in services
 - Bandwidth restrictions and variability
- Dynamic replication of data
 - Data and services follow users
- Querying data - location-based responses
- Security and authentication
- System configuration is no longer static

Portability Characteristics

- Battery power restrictions
 - Transmit/Receive, disk spinning, display, CPUs, memory consume power
- Battery lifetime will see very small increase
 - Need energy efficient hardware (CPUs, memory) and system software
- Resource constraints
 - Mobile computers are resource poor
 - Reduce program size – interpret script languages (Mobile Java Script?)
- Small screen sizes
- Power Consumption vs. Resource Utilization

Types of Wireless Communication



Wireless Telecommunications Networks (1)

- 1G
 - The first generation of wireless technology, which was analog based
- 2G
 - The second generation of digital wireless technology; accommodates voice and text
- 2.5G
 - An interim wireless technology that can accommodate voice, text, and limited graphics

Wireless Telecommunications Networks (2)

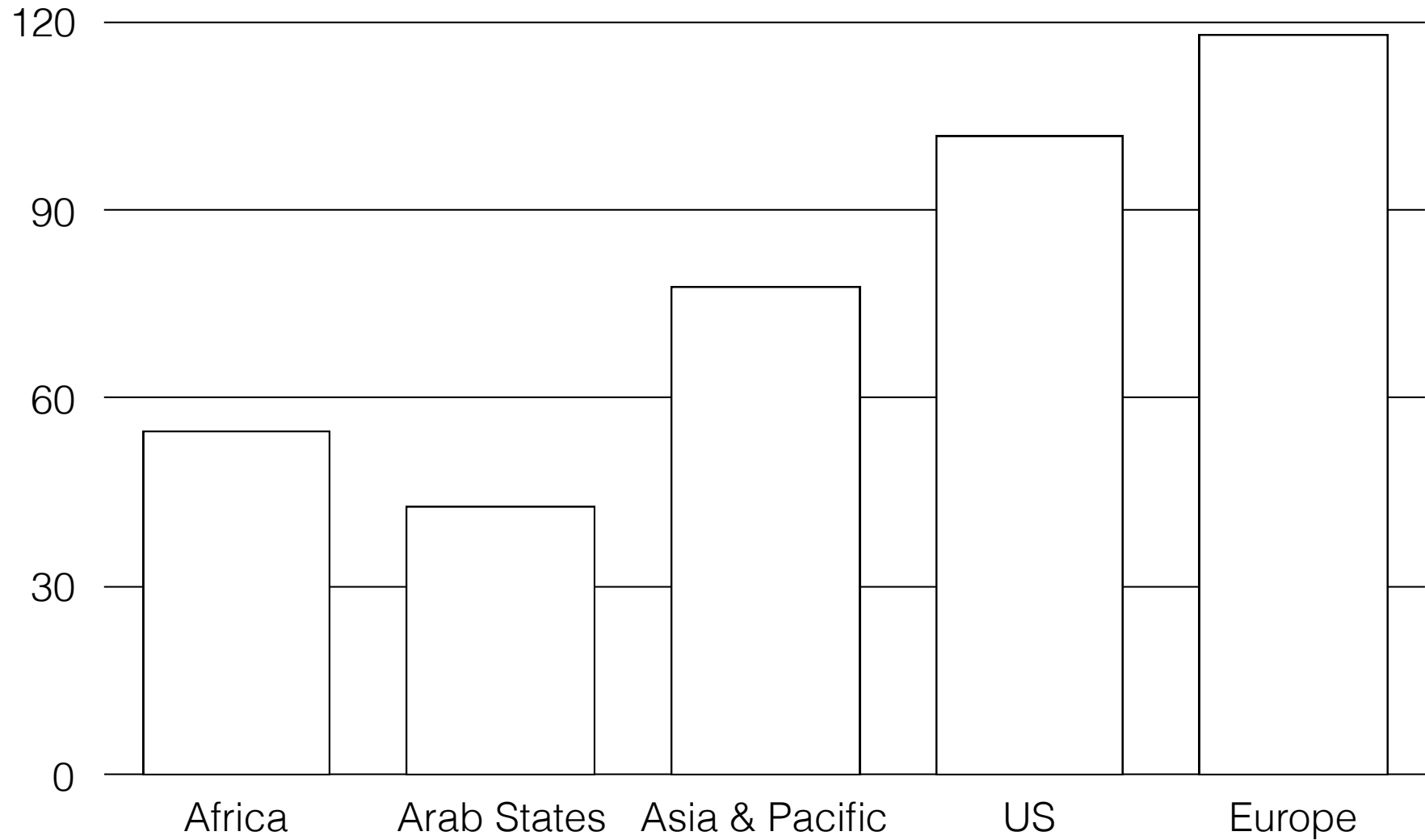
- 3G
 - The third generation of digital wireless technology; supports rich media such as video
- 3.5G
 - This generation was inserted into the ranks of cell phone generations; it refers to the packet-switched technologies used to achieve higher transmission speeds
- 4G
 - The expected next generation of wireless technology that will provide faster display of multimedia

Mobile Computing Devices

- Personal Digital Assistant (PDA) / Enterprise Digital Assistant
- Smartphone
- Tablet Computer
- Ultra-Mobile PC
- Wearable computer



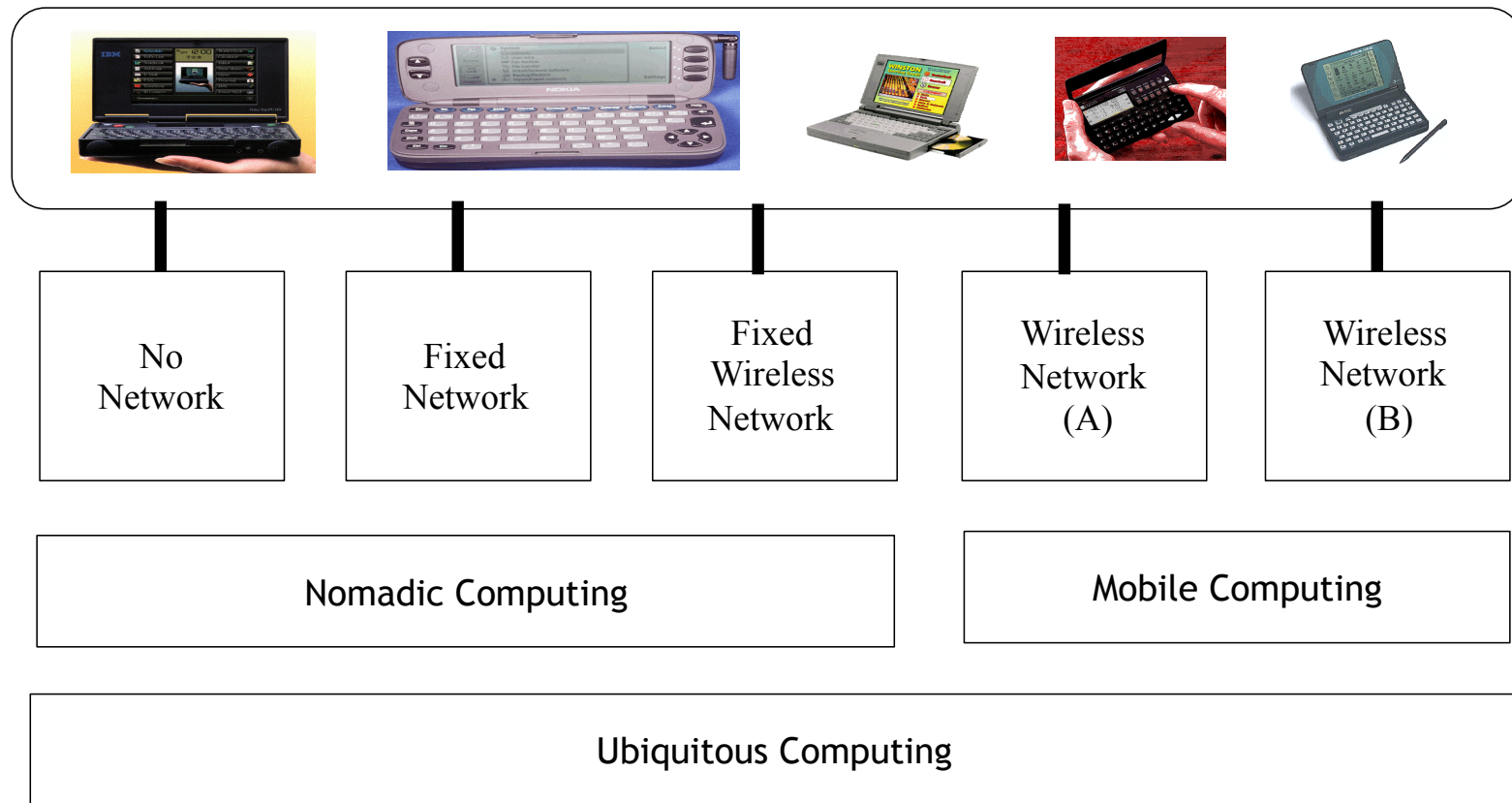
Ubiquitous Nature of Smart Mobile Devices



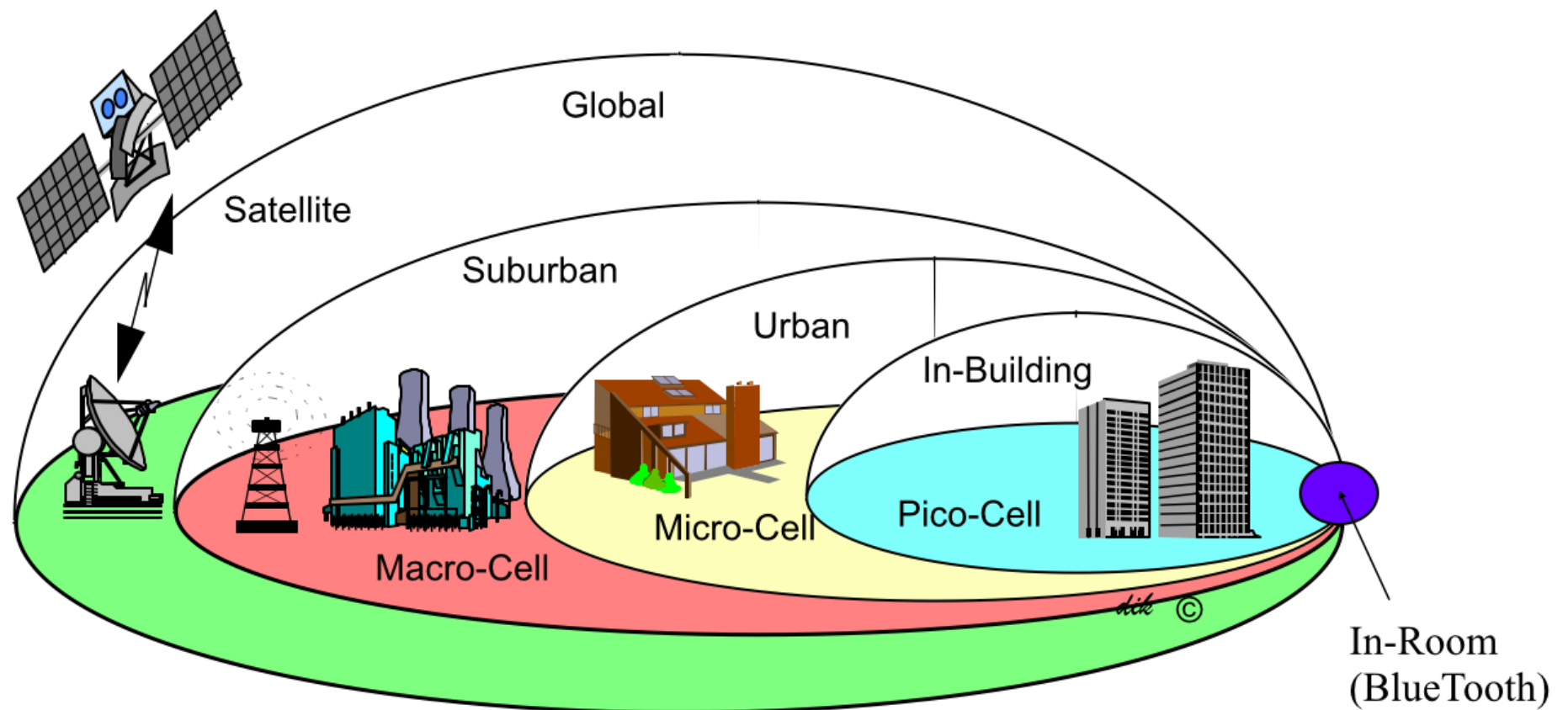
Mobile Computing Limitations

- **Range & Bandwidth:** Mobile Internet access is generally slower than direct cable connections,
- **Security Standards:** When working mobile, one is dependent on public networks.
- **Power Consumption:** rely entirely on battery power
- **Transmission Interferences:** Weather, terrain, and the range from the nearest signal point can all interfere with signal reception.
- **Potential Health Hazards:** more likely to be involved in traffic accidents.
- **Human Interface with Device:** Screens and keyboards tend to be small, which may make them hard to use.

Nomadic, Mobile & Ubiquitous



Impressive Wireless Infrastructure !



Mobile Applications

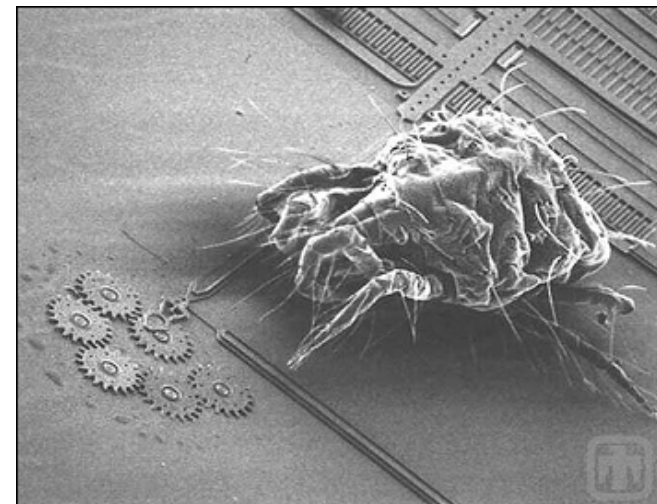
- Expected to create an entire new class of Applications
 - New massive markets in conjunction with the Web
 - Mobile Information Appliances - combining personal computing and consumer electronics
- Applications:
 - Vertical: vehicle dispatching, tracking, point of sale
 - Horizontal: mail enabled applications, filtered information provision, collaborative computing...

General examples Of Mobile Computing Applications

- Vehicles
- Emergencies
- Traveling Salesman
- Entertainment
- Education
- Location Dependent Services etc.

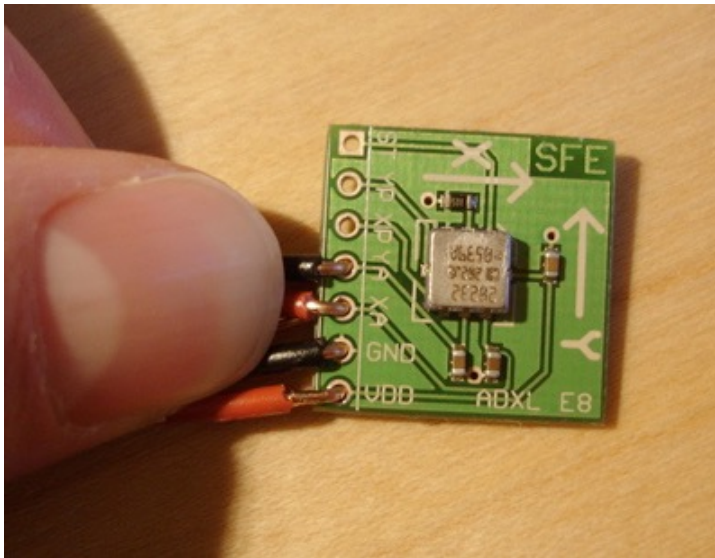
Micro-Electro-Mechanical System (MEMS)

- Micro-Electro-Mechanical Systems, or MEMS, is a technology that in its most general form can be defined as miniaturized mechanical and electro-mechanical elements (i.e., devices and structures) that are made using the techniques of microfabrication.
- The critical physical dimensions of MEMS devices can vary from well below one micron on the lower end of the dimensional spectrum, all the way to several millimeters.

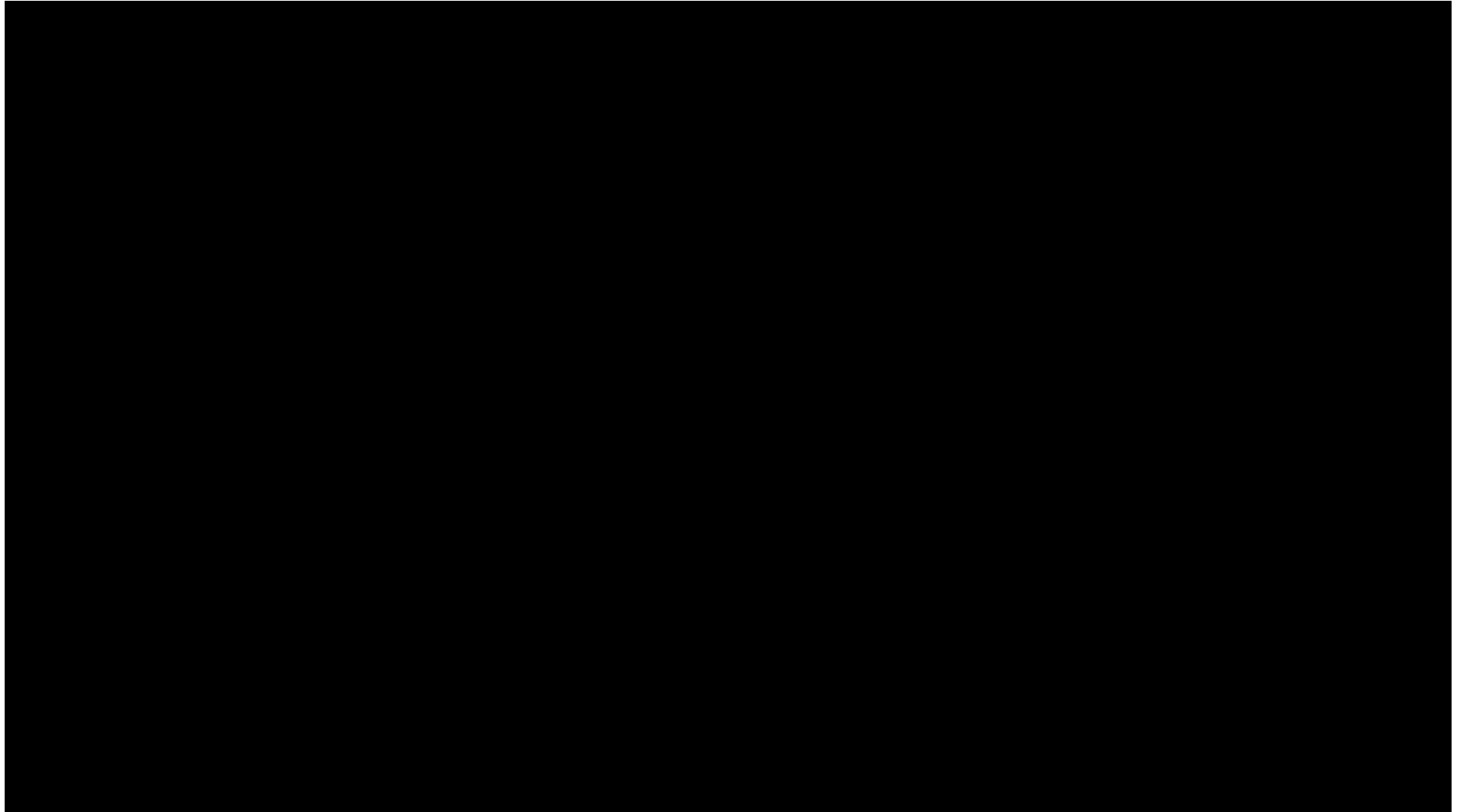


Accelerometer (1)

- An accelerometer is an electromechanical device that will measure acceleration forces. These forces may be static, like the constant force of gravity pulling at your feet, or they could be dynamic - caused by moving or vibrating the accelerometer.

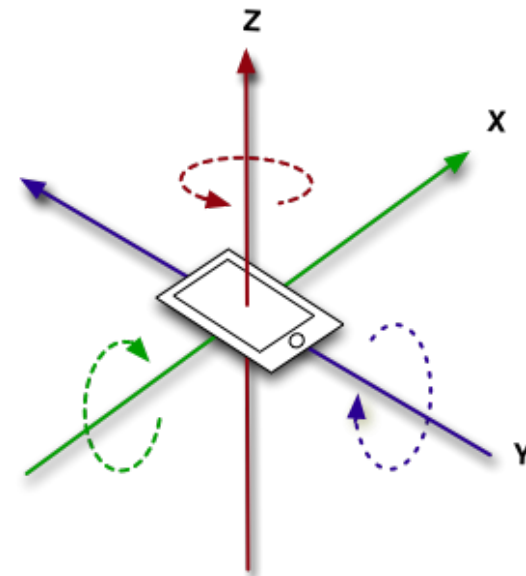


Accelerometer (2)

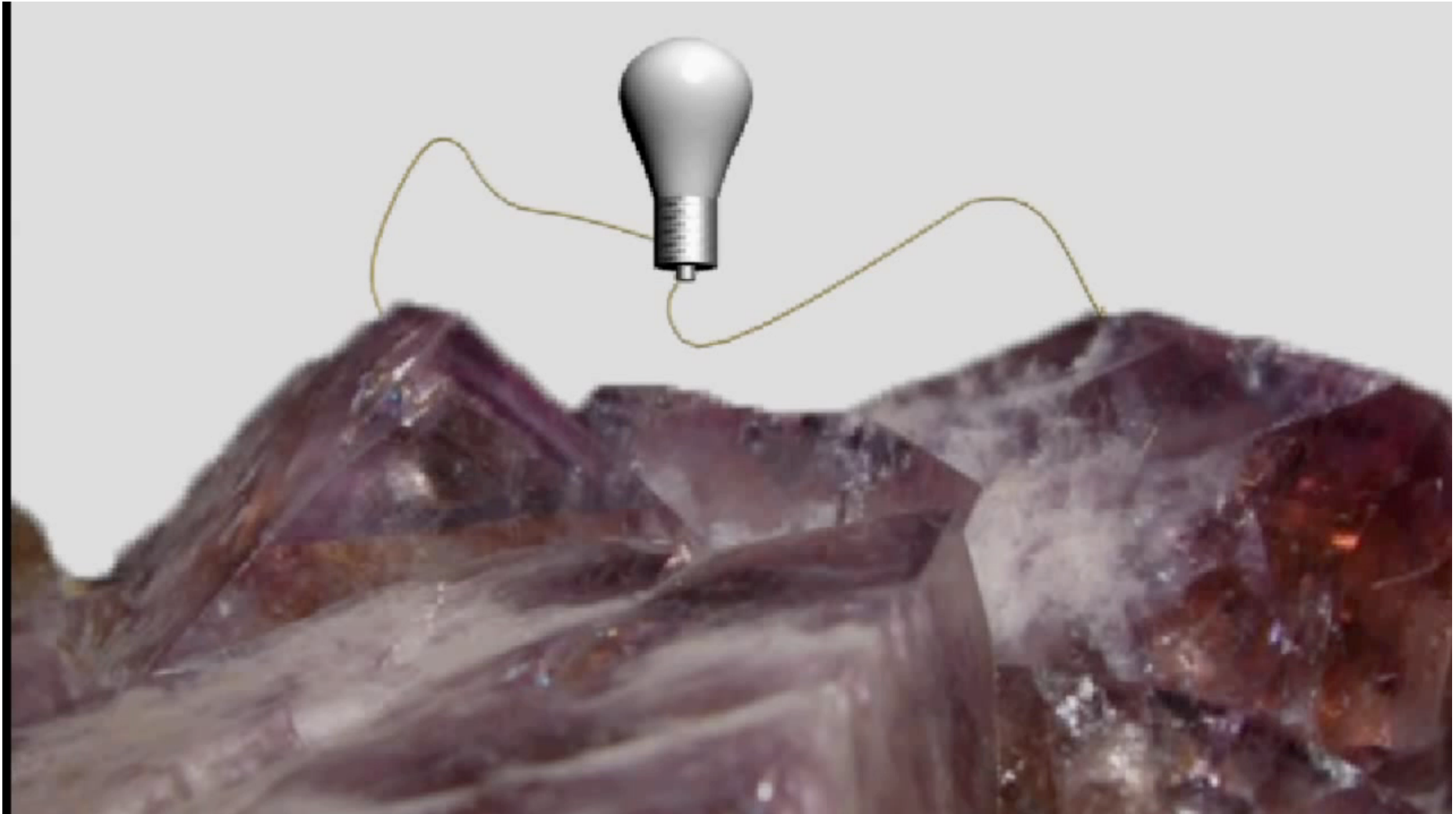


Gyroscope (1)

- A gyroscope is a device that uses Earth's gravity to help determine orientation. Its design consists of a freely-rotating disk called a rotor, mounted onto a spinning axis in the center of a larger and more stable wheel. As the axis turns, the rotor remains stationary to indicate the central gravitational pull, and thus which way is “down.”



Gyroscope (2)



Uses of a Gyroscope or Accelerometer

- The main difference between the two devices is simple: one can sense rotation, whereas the other cannot.
- The accelerometer can gauge the orientation of a stationary item with relation to Earth's surface.
- The gyroscope maintains its level of effectiveness by being able to measure the rate of rotation around a particular axis.

Meet the SixthSense Interaction

