

IT ARCHITECTURE

MOBILE SYSTEM

PERVASIVE COMPUTING

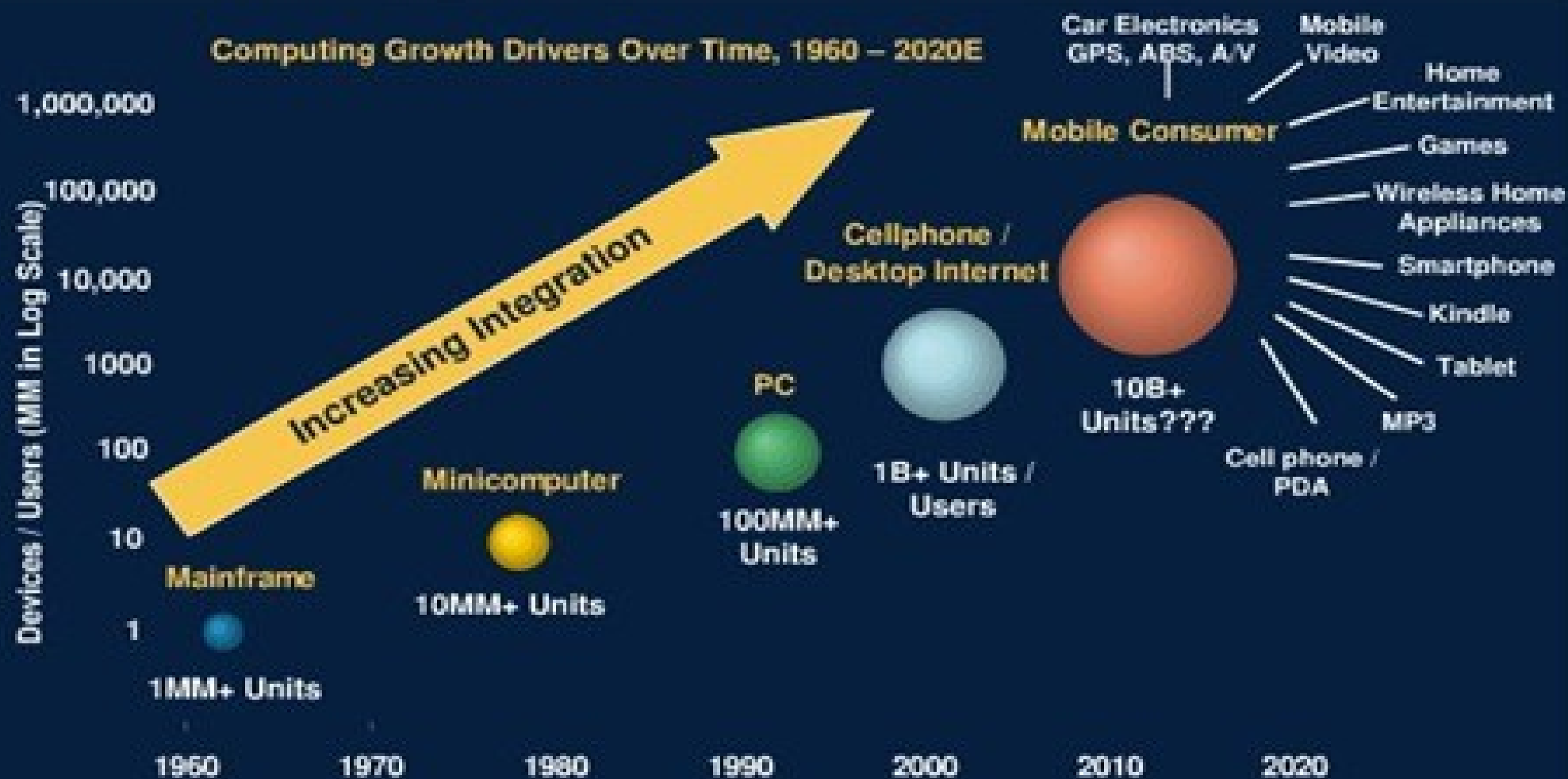
ARCHITECTURE

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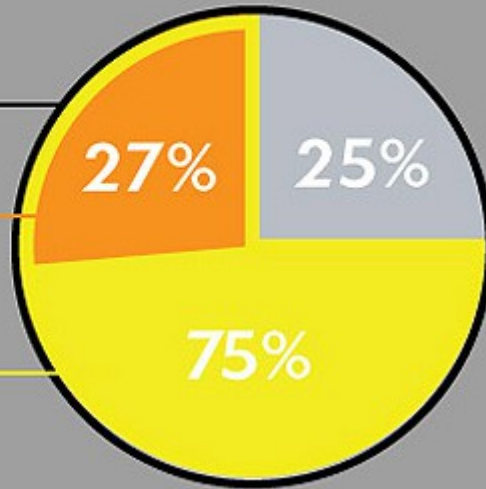
New Computing Cycles Supported by 10x More Devices

Opportunities for Semiconductor / Hardware / Software / Services



📱 What is the size of the mobile market?

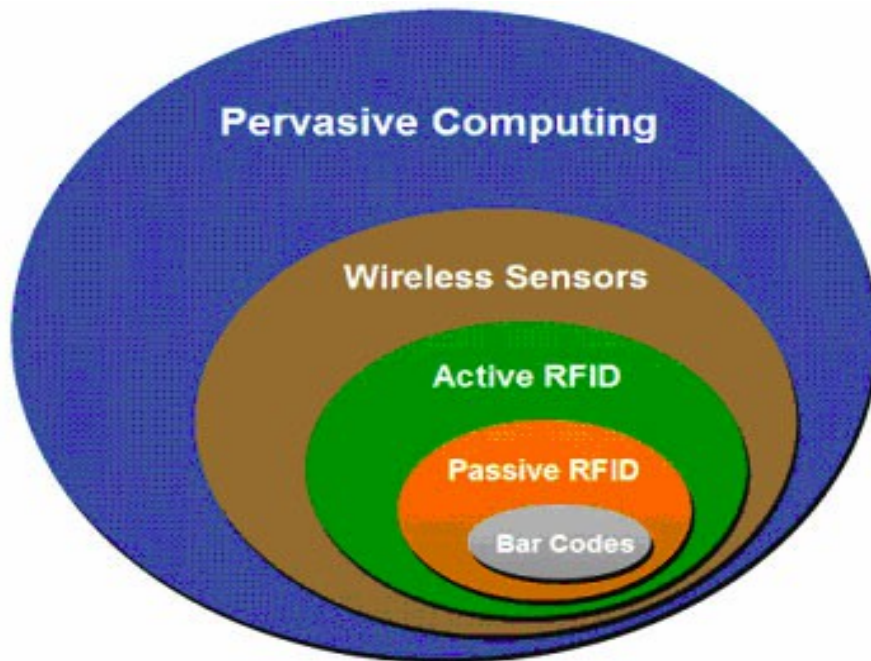
Of the world's
4 billion mobile phones in use,
1.08 billion are smartphones
 and a whopping
3.05 billion are SMS enabled
 (950 million are not SMS enabled)



📱 How fast is mobile internet growing?

By 2014, mobile internet should take over desktop internet usage

Global Mobile vs. Desktop Internet User Projection, 2007 - 2015E



Mobility	High	Mobile Computing	Ubiquitous Computing
	Low	Traditional Computing	Pervasive Computing
		Low	High
		Embeddedness	

Source: Lyytinen (2003)

Mobile Computing



Designed by Ken Sakamura

Characteristics

- Ubiquity: computation everywhere anytime
- Convenience :
 - ◆ Instant connectivity
 - ◆ Portability
 - ◆ Personalization
 - ◆ Localization of products & services
- Interactivity: data sharing and collaboration
- Context Sensitivity : location-based data

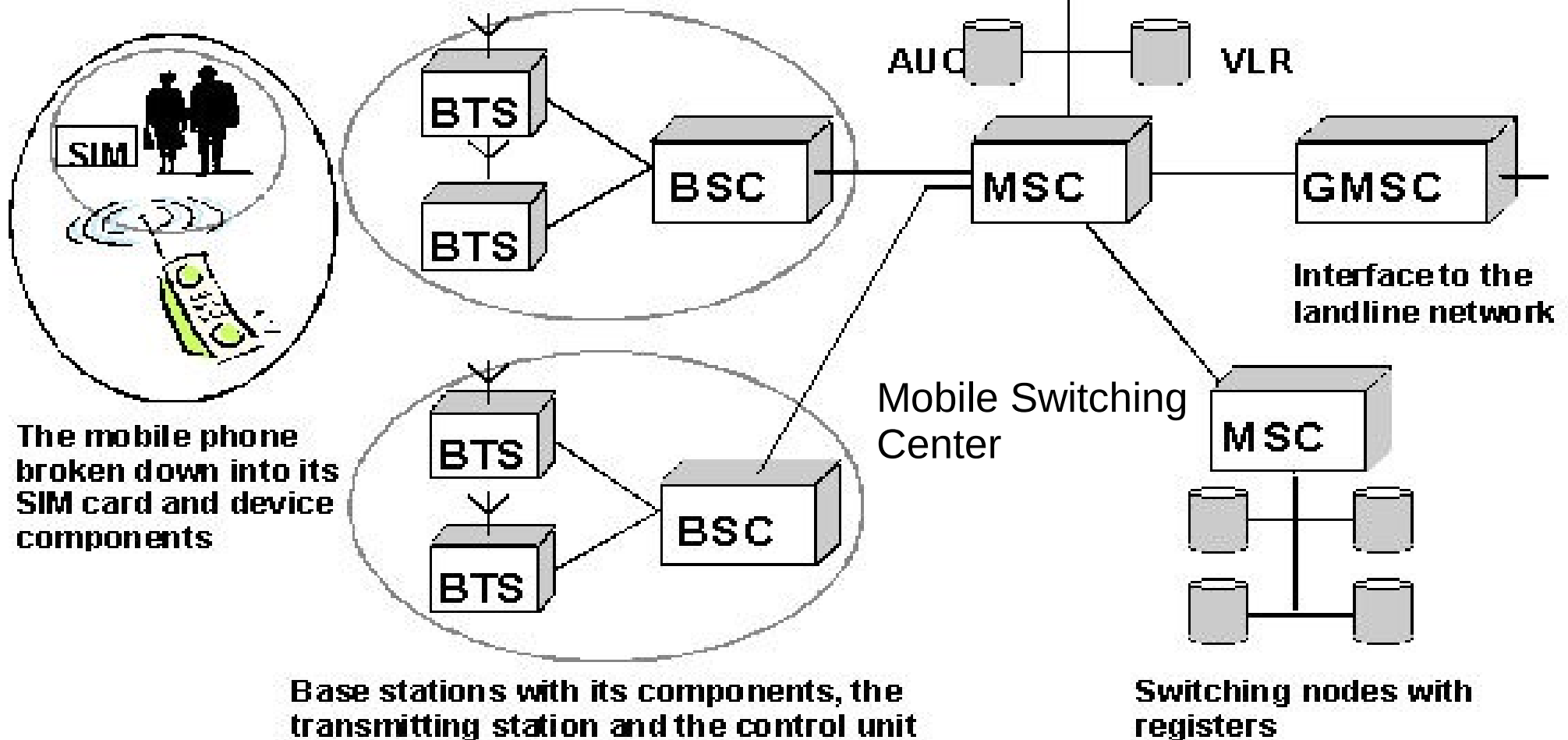
Problems

- Line of sight
- Protocol of security
- Interferences
- Weather-sensitive
- Distance limitations
- Legality in frequency

GSM (Global System for Mobile Communication)

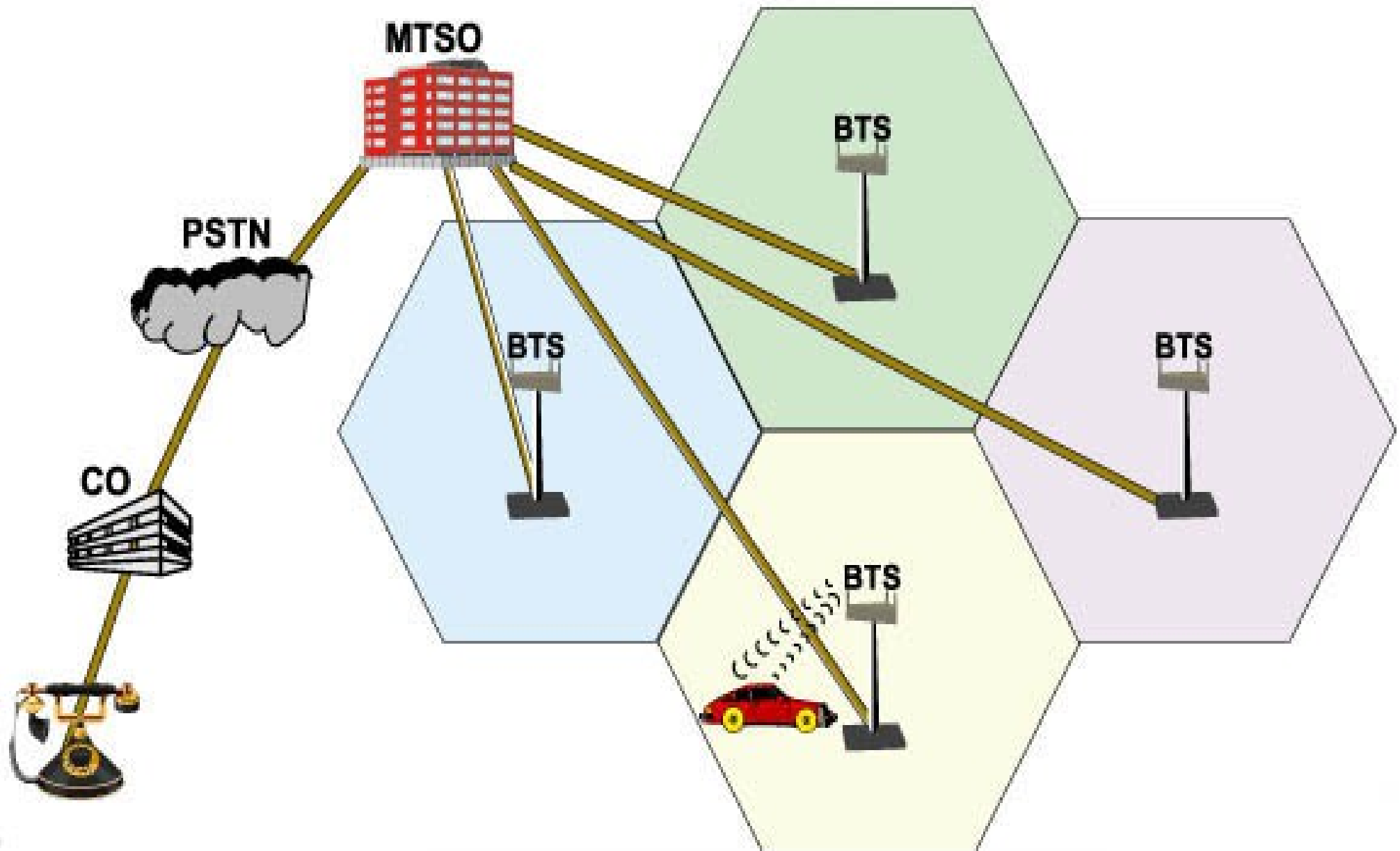
Base Transceiver Station

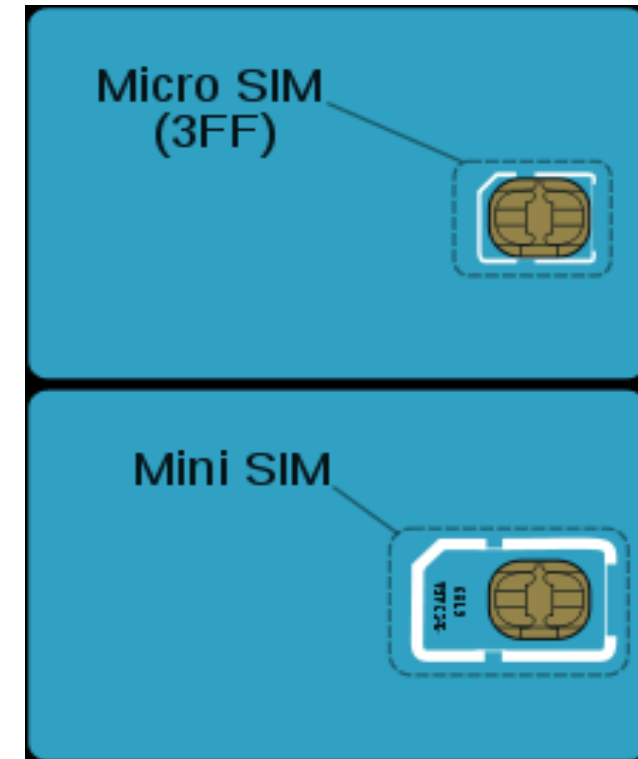
Base Station Controller



Mobile Telephone Switching Office

Public Switched Telephone Network





SIM = Subscriber Identity Module

Integrated Circuit Card Identifier

International Mobile Equipment Identity

Cellular Generations

1G

- Basic Mobility
- Basic Services
- Incompatibility
- Analog System

2G

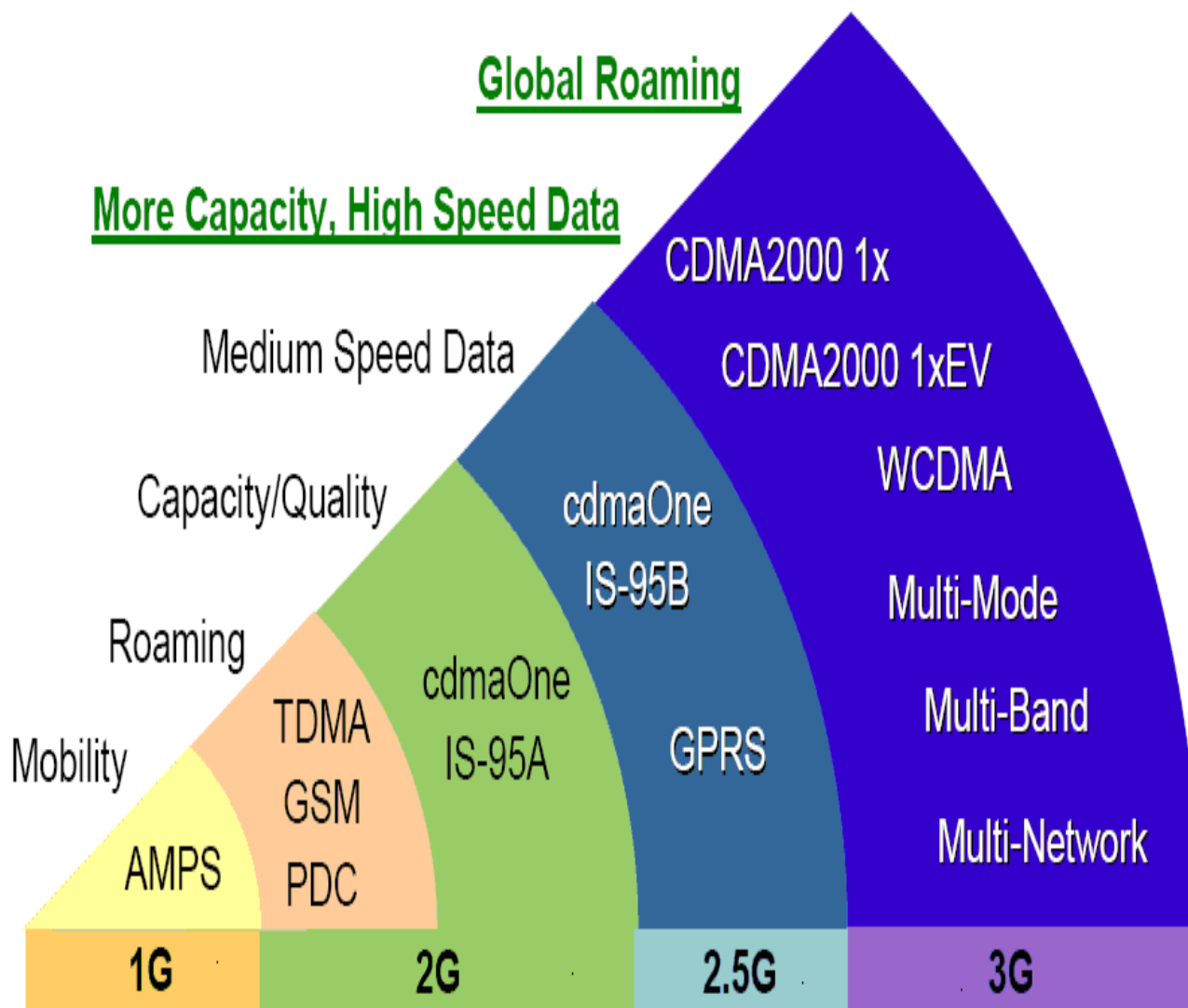
- Advanced Mobility (Roaming)
- More Services (Data Presence)
- Towards Global Solution
- Digital System

3G

- Seamless Roaming
- Service Concepts & Models
- Global Radio Access
- Global Solution
- High data rates

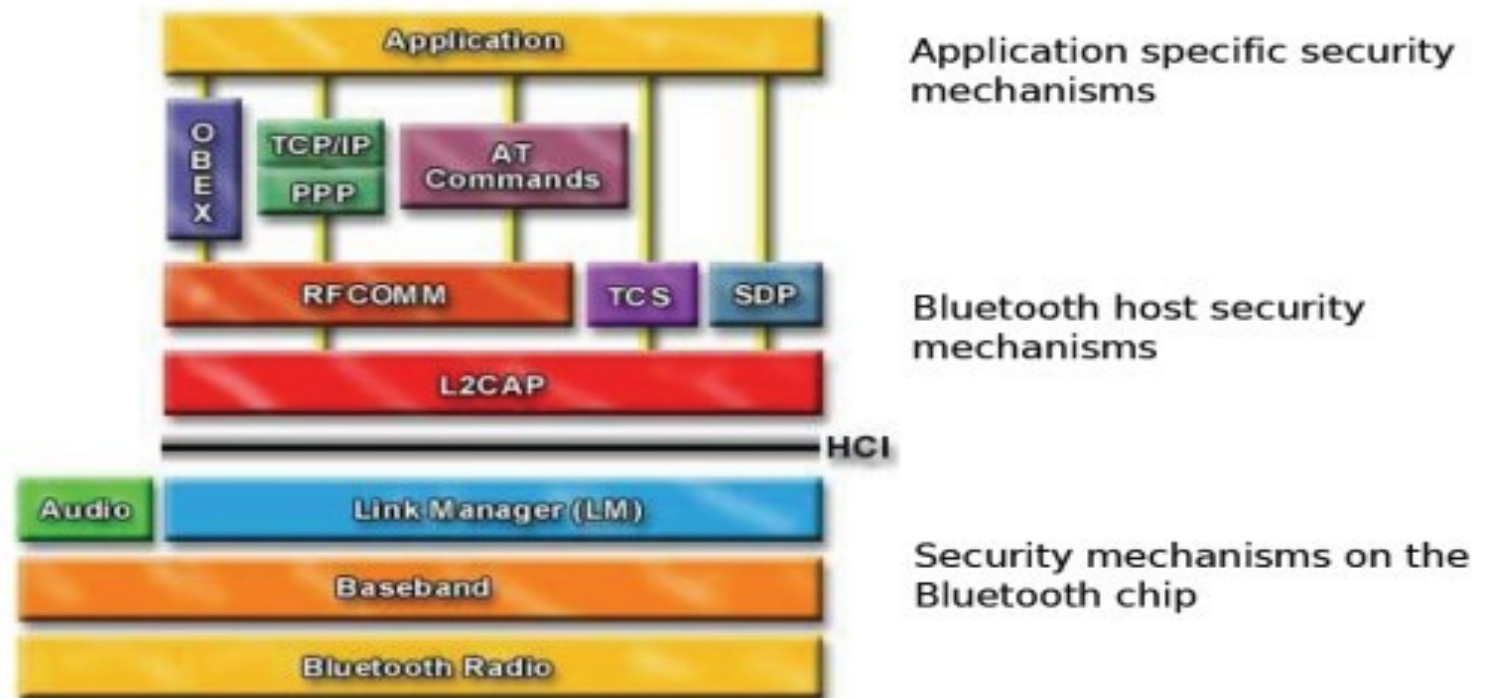
4G

- IP Based Mobility
- Very High Data Rates
- Complete Telecom/Datacom Convergence



1G	- Voice Signals Only - Analogue Cellular Phones - NMT, AMPS
2G	- Voice & Data Signals - Digital Fidelity Cellular Phones - GSM, CDMA, TDMA
2.5G	- Enhance 2G - Higher Data Rates - GPRS, EDGE
3G	- Voice, Data & Video Signals - Video Telephony / Internet Surfing 3G, W-CDMA, UMTS
4G	- Enhanced 3G / Interoperability Protocol - High Speed & IP-based 4G, Mobile IP

Image Courtesy: <http://www.rajeshtimane.com>

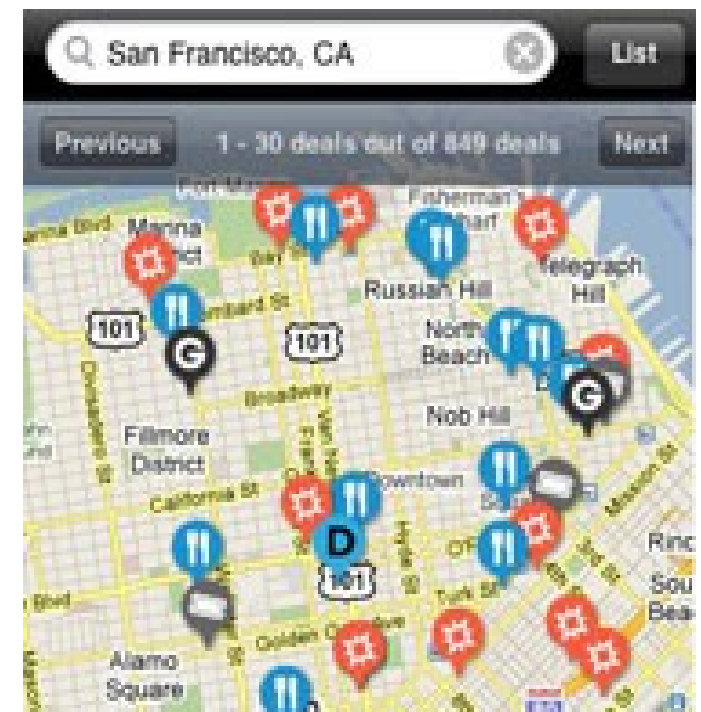


Class	Maximum Power	Range
Class 1	100mW (20dBm)	~100 meters
Class 2	2.5mW (4dBm)	~10 meters
Class 3	1mW (0dBm)	~1 meter



802.11 protocol	Freq. (GHz)	Bandwidth (MHz)	Data rate per stream (Mbit/s)	Allowable MIMO streams	Modulation	Approximate indoor range		Approximate outdoor range	
						(m)	(ft)	(m)	(ft)
—	2.4	20	1, 2	1	DSSS,FHSS	20	66	100	330
a	5	20	6, 9, 12, 18, 24, 36, 48, 54	1	OFDM	35	115	120	390
	3.7					—	—	5,000	16,000
b	2.4	20	5.5, 11	1	DSSS	38	125	140	460
g	2.4	20	6, 9, 12, 18, 24, 36, 48, 54	1	OFDM,DSSS	38	125	140	460
n	2.4/5	20	7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2	4	OFDM	70	230	250	820
		40	15, 30, 45, 60, 90, 120, 135, 150			70	230	250	820

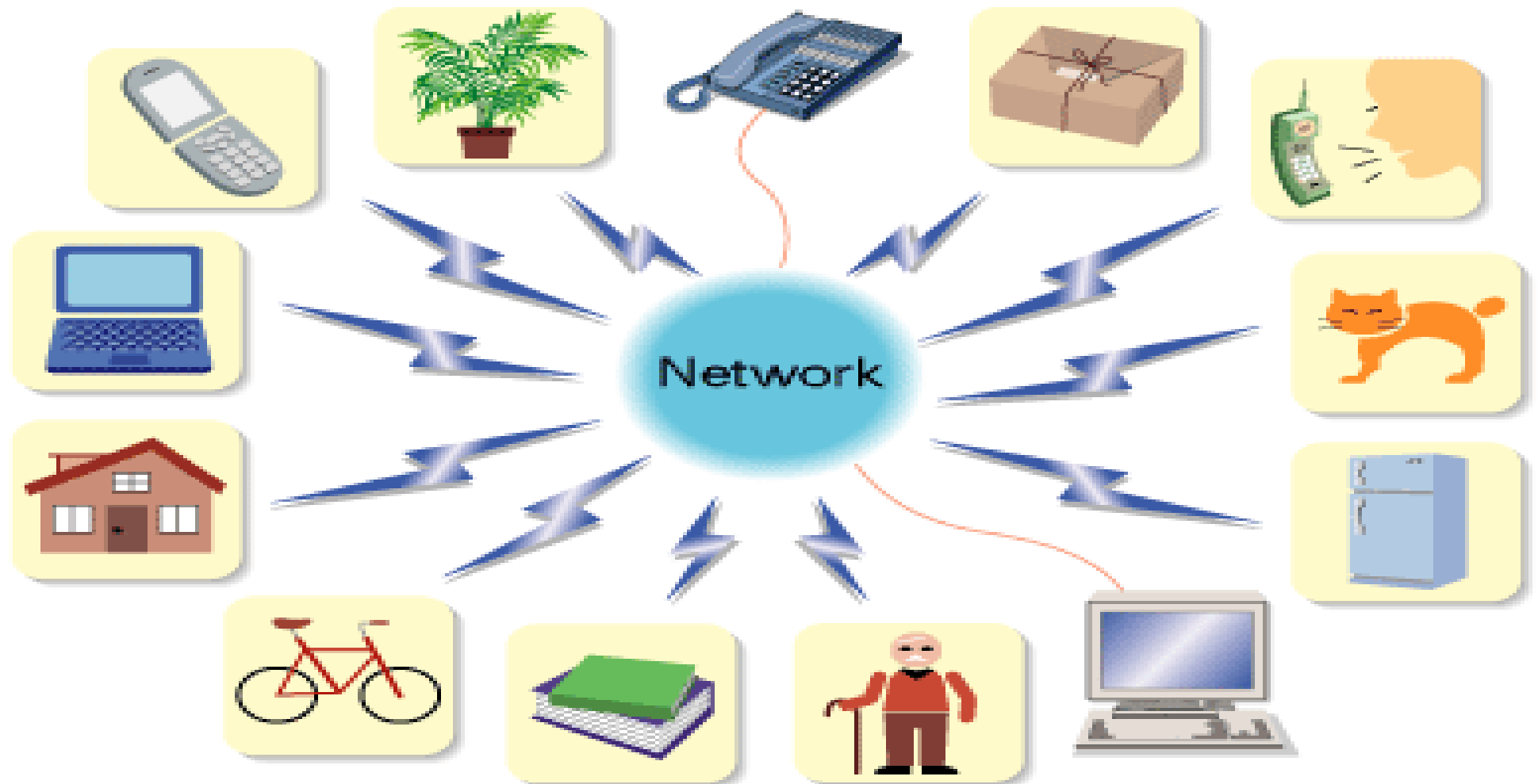
Location-Based Commerce



Pervasive Computing



Ubiquitous Computing

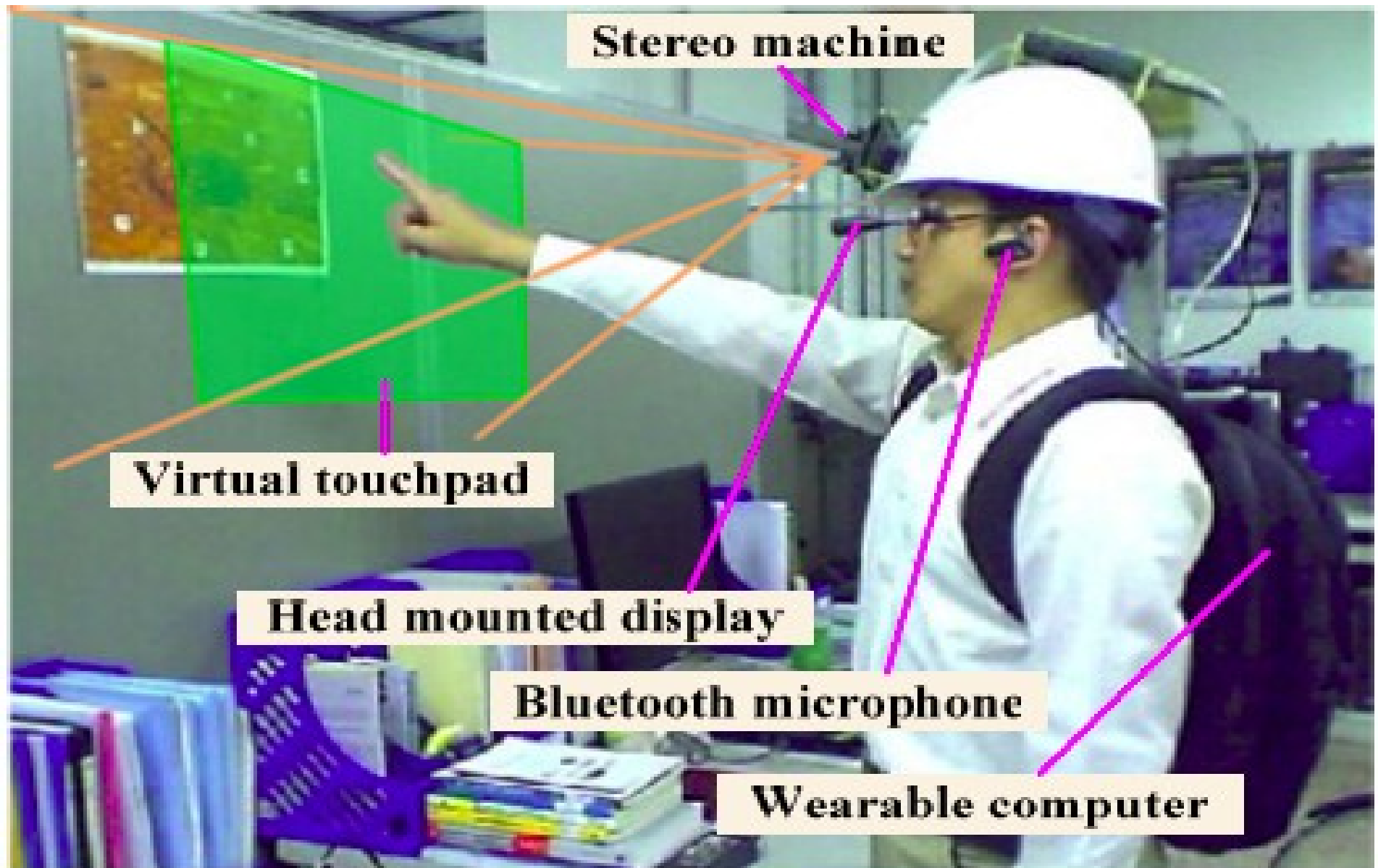


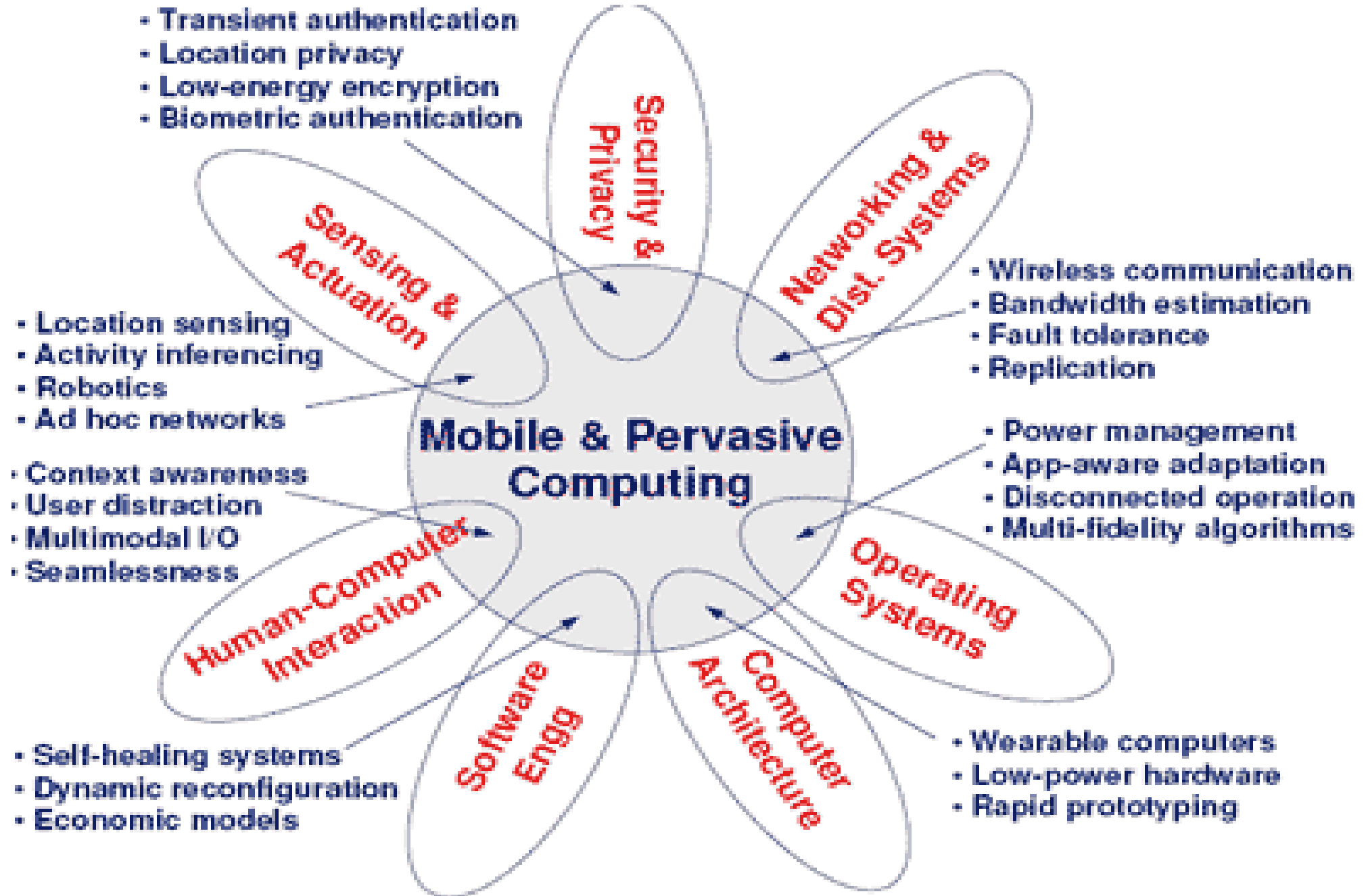
Ubiquitous computing will enable diverse wireless applications, including monitoring of pets and houseplants, operation of appliances, keeping track of books and bicycles, and much more.

Ubiquitous Computing



Wearable Computing





Augmented Reality

