Cellular Systems: towards 3G

SCHOOL ON RADIO USE

FOR DIGITAL AND

MULTIMEDIA

COMMUNICATIONS

TELIT MOBILE TERMINALS
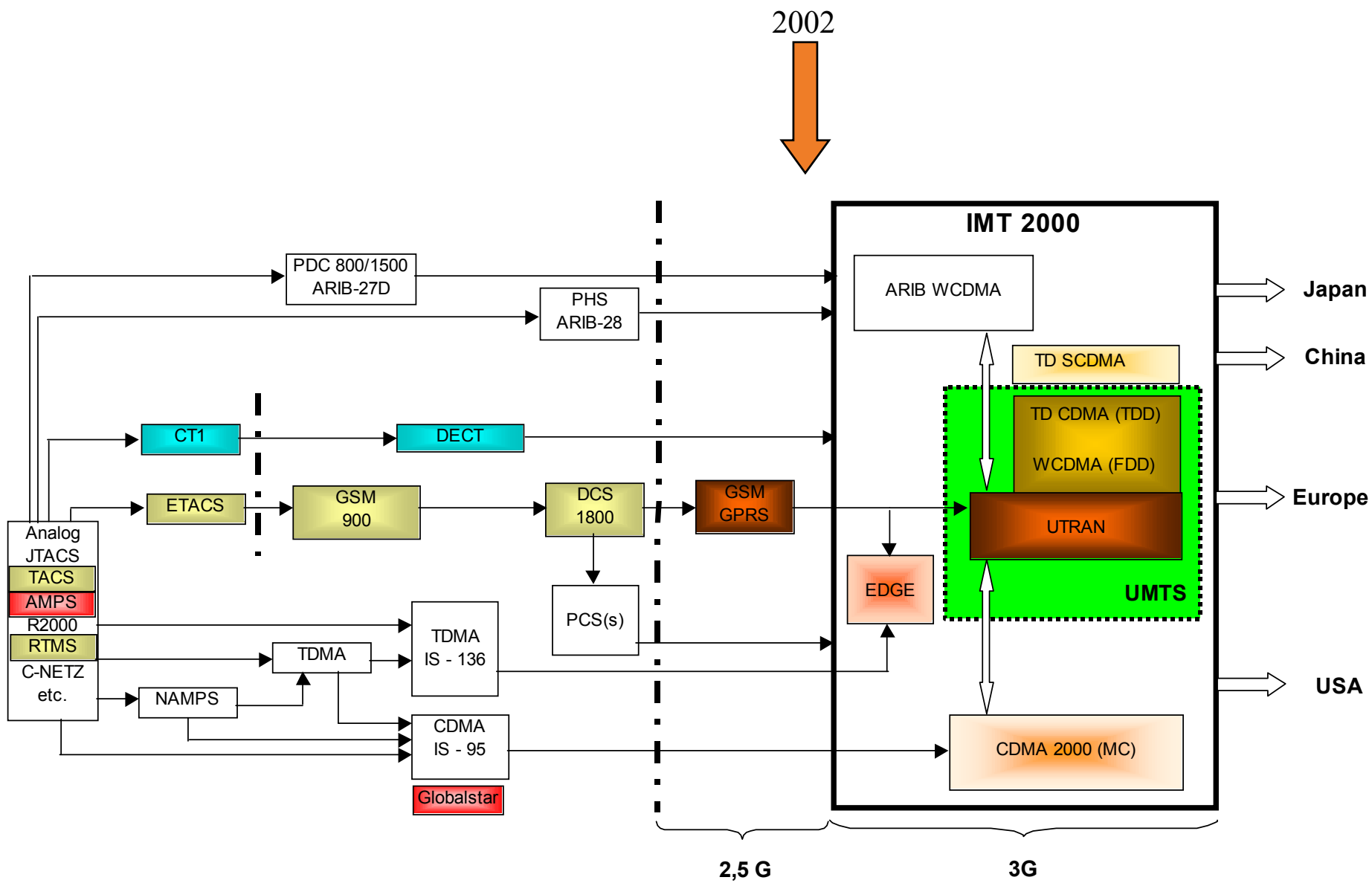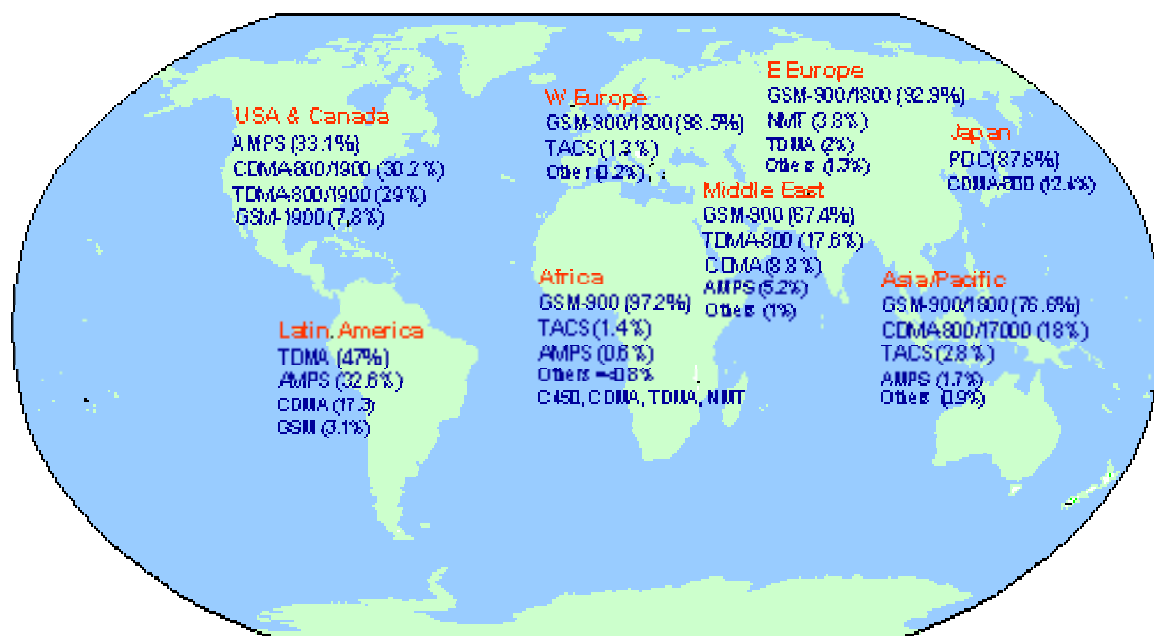
Different approaches Towards 3G

○ In 2001 this School gave the opportunity to present the Telit vision of cellular systems towards 3G.
The lecture was based on:
- Standards scenario and evolution;
- From voice to data evolution, towards multimedia;
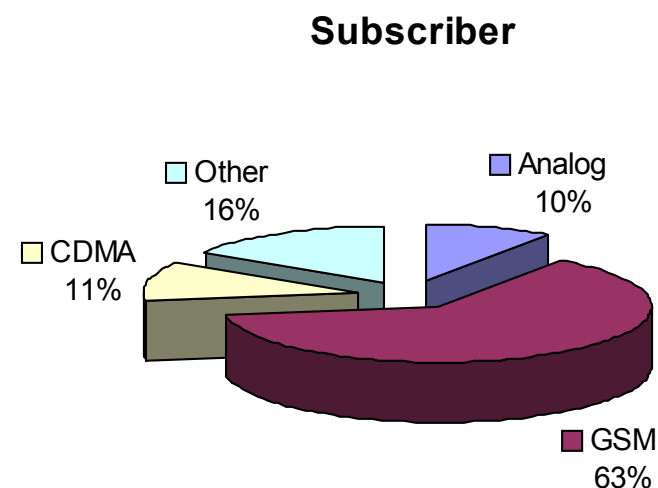- Handset architecture evolution.

○ In this session is presented the same argument of 2001, but with a modified viewpoint.
The intention is to highlight the importance of innovative Ideas, and how they play a relevant role in the new generation cellular systems.
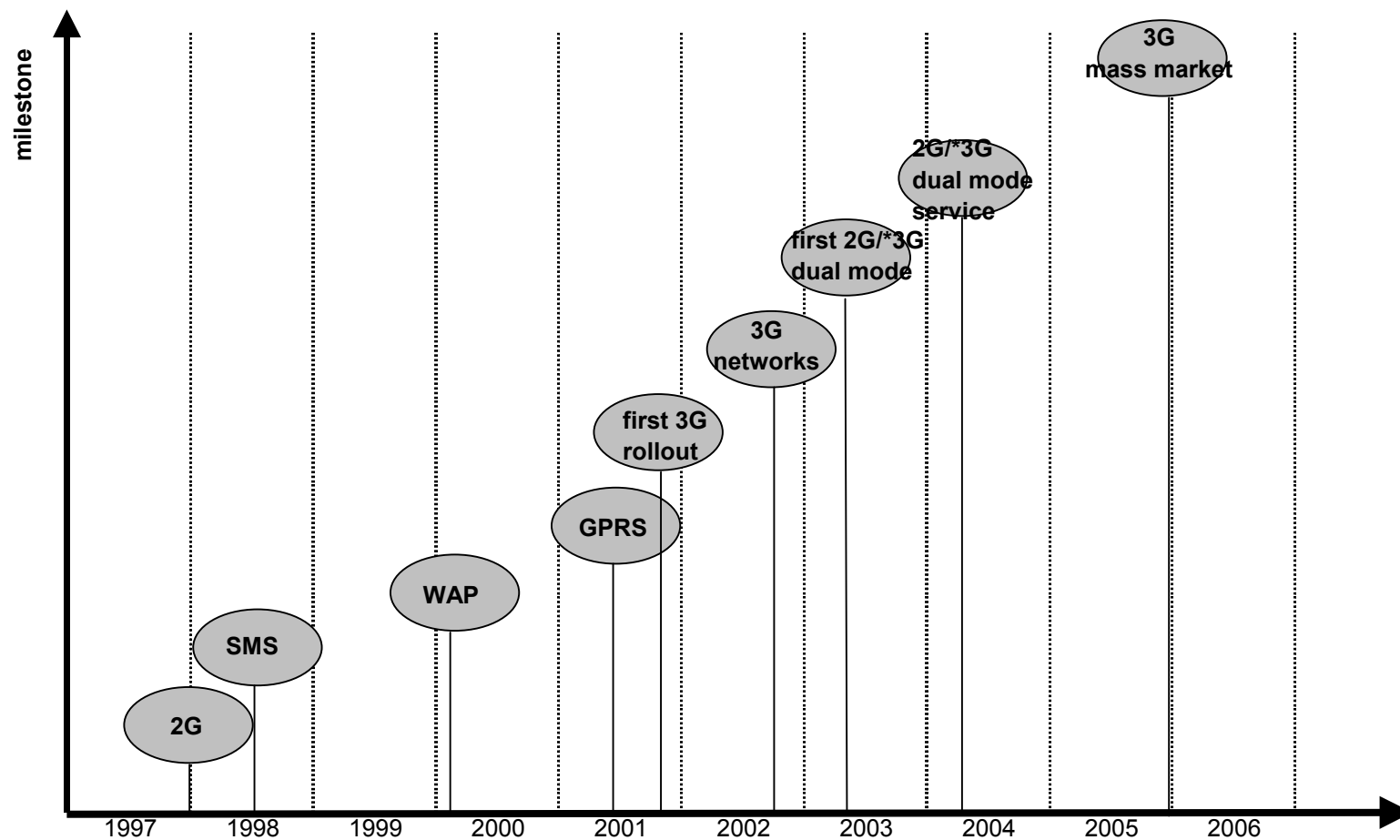So the principal viewpoint is the Intellectual Property.

○ *The normal direction of the presentation may be summarized:*
- *"from market and technical scenarios to concepts".*
But the correct mode to implement this proposal should be a reverse direction:
- *"from concepts to market and technical scenarios"*
(i.e. from last slide to the first one)

2002

IMT 2000

PDC 800/1500
ARIB-27D

PHS
ARIB-28

ARIB WCDMA

Japan

TD SCDMA

China

CT1

DECT

TD CDMA (TDD)

WCDMA (FDD)

Europe

ETACS

GSM
900

DCS
1800

GSM
GPRS

UTRAN

UMTS

Analog
JTACS

TACS

AMPS

R2000

RTMS

C-NETZ
etc.

PCS(s)

EDGE

TDMA

NAMPS

TDMA
IS - 136

CDMA
IS - 95

CDMA 2000 (MC)

USA

Globalstar

2,5 G

3G

Subscriber

- Other 16%
- Analog 10%
- CDMA 11%
- GSM 63%

Subscriber (in mln)	Dic '00
Analog	69,3
GSM	455,1
CDMA	81,9
Other	115,1
Total	**721,4**

milestone

3G
mass market

2G/*3G
dual mode
service

first 2G/*3G
dual mode

3G
networks

first 3G
rollout

GPRS

WAP

SMS

2G

1997 1998 1999 2000 2001 2002 2003 2004 2005 2006

● The use of cellular is moving from voice to data, and to multimedia model.
Multimedia means **contents / services**, and the contents will force the evolution towards 3G.

● To focus the evolution towards multimedia, is important to consider the **messaging technology** roadmap:
- **SMS**: Short Messaging Services; only text; 160 chars; no real time
- **IM**: Instant Messaging; real time, permits "chat services"; people always on;
- **UM**: Unified Messaging; access to a single mailbox with different technology (text to speech; e-mail to SMS, etc.)
- **MMS**: Multimedia Messaging Service; image and / or audio clips are send as part of a message.

● The next step of the roadmap towards multimedia, are:
- **Internet browsing**
- **Videotelephony**
- **Broadband entertainment** (Video and Television)

	SMS	E-MAIL	ICONS GRAFIC PICT. EMS	DIGITAL PHOTO	COLOR PICT. VIDEOCLIP MMS VIDEO GAMES	VIDEOSTREAMING
	2000		2001		2002	2003
	WAP			WAP + GPRS		UMTS
	9,6		28,8	56,0	128,0	384,0
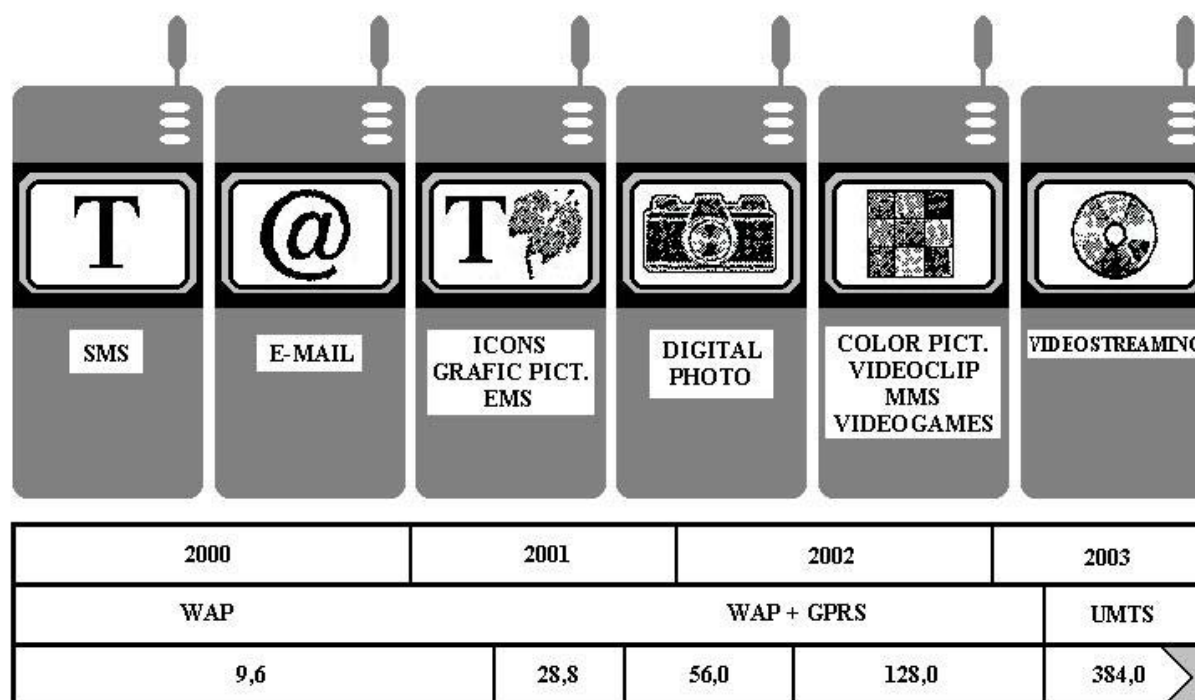
Mobile Data Applications - estimated download time

| Service	File Size	GSM 9,6 kbps	GPRS 25 kbps	PSTN 28 kbps	UMTS 50 kbps	ISDN 64 kbps	GPRS 114 kbps	UMTS 2 Mbps
E-mail	9 Kb	8 s	3 s	3 s	1 s	1 s	0,7 s	0,04 s
Web Page	10 Kb	9 s	3 s	3 s	1 s	1 s	0,8 s	0,04 s
Text File	40 Kb	33 s	13 s	11 s	6 s	5 s	3 s	0,2 s
Video Clip	4 Mb	48 min	21 min	18 min	11 min	8 min	4 min	14 s

subscriber
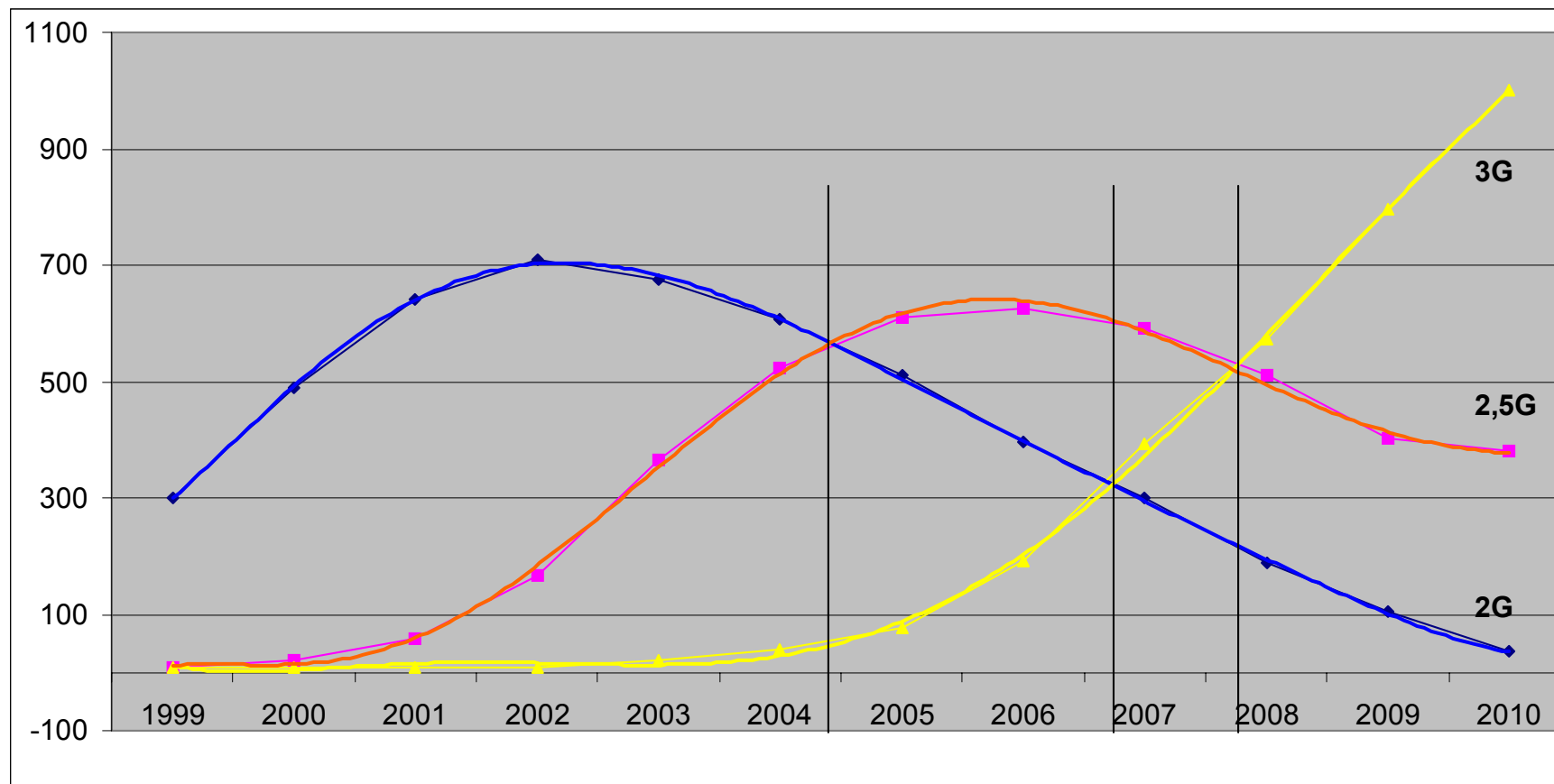
data from Ovum ltd / EMC and elaborated by Telit

- In the United States 76% of people is joined to activities related to **knowledge**.
  The 26% of GDP (Gross Domestic Product) is based on the **persuasion**, that is based and uses of knowledge.

- Knowledge belongs to groups and teams, instead of individual basis.

- Knowledge, ideas, concepts in industrial scenarios are fixed in patents and WIPO (World Intellectual Property Organization) is in charge to manage this formalism, with precise rules.

- Knowledge is the only mode to participate to every evolution, wireless and cellular too, from a leading position, instead of as a follower.

- **Given a particular technical scenario, the core of every evolution is to address the resources of groups and teams in the right direction.**

Applications filed in US in 2001, by IT Companies:

IBM	3.453
NEC	1.966
CANON	1.877
MICRON	1.643
SAMSUNG	1.451

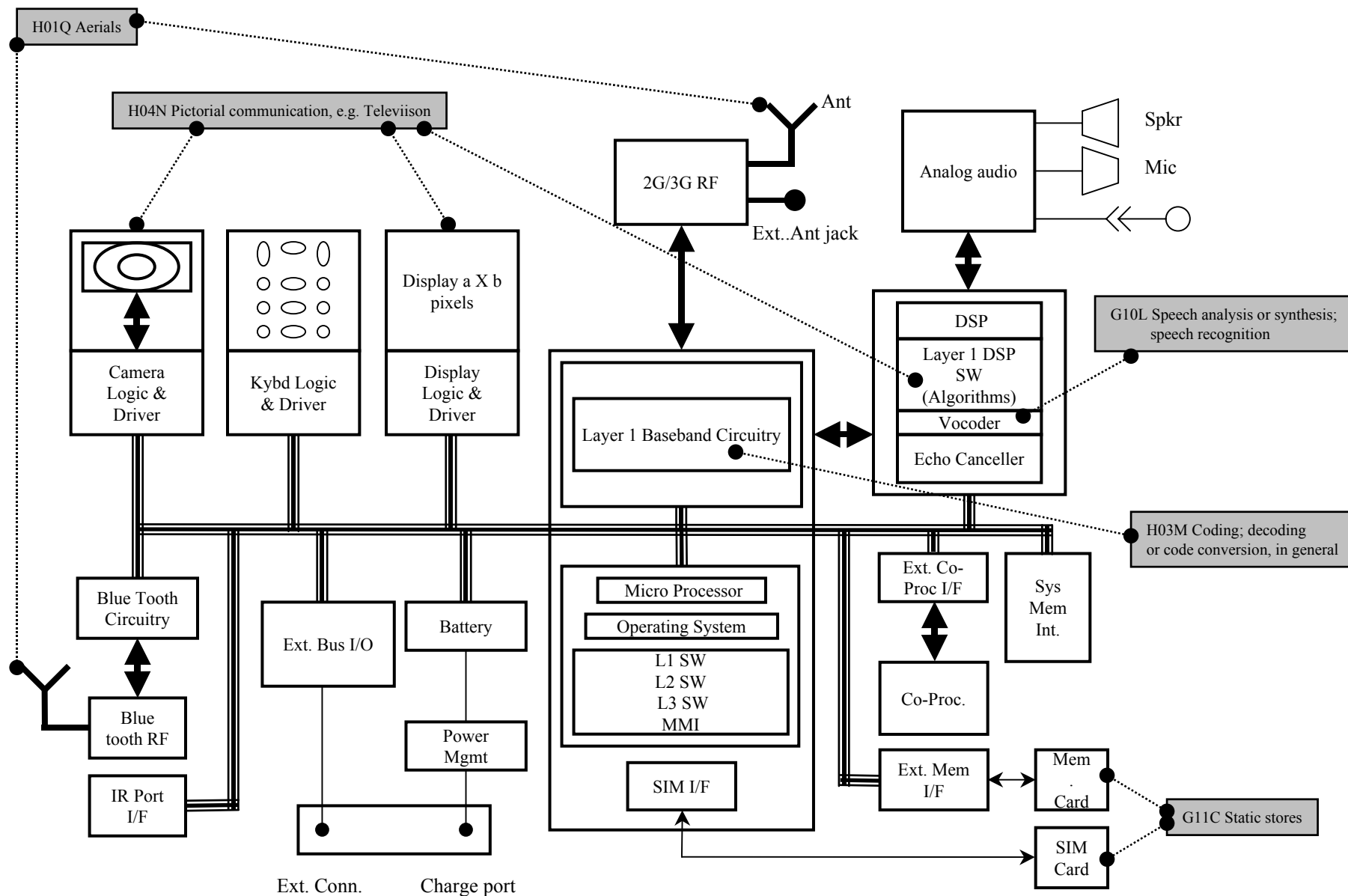Number of International application received by WIPO over last 20 years
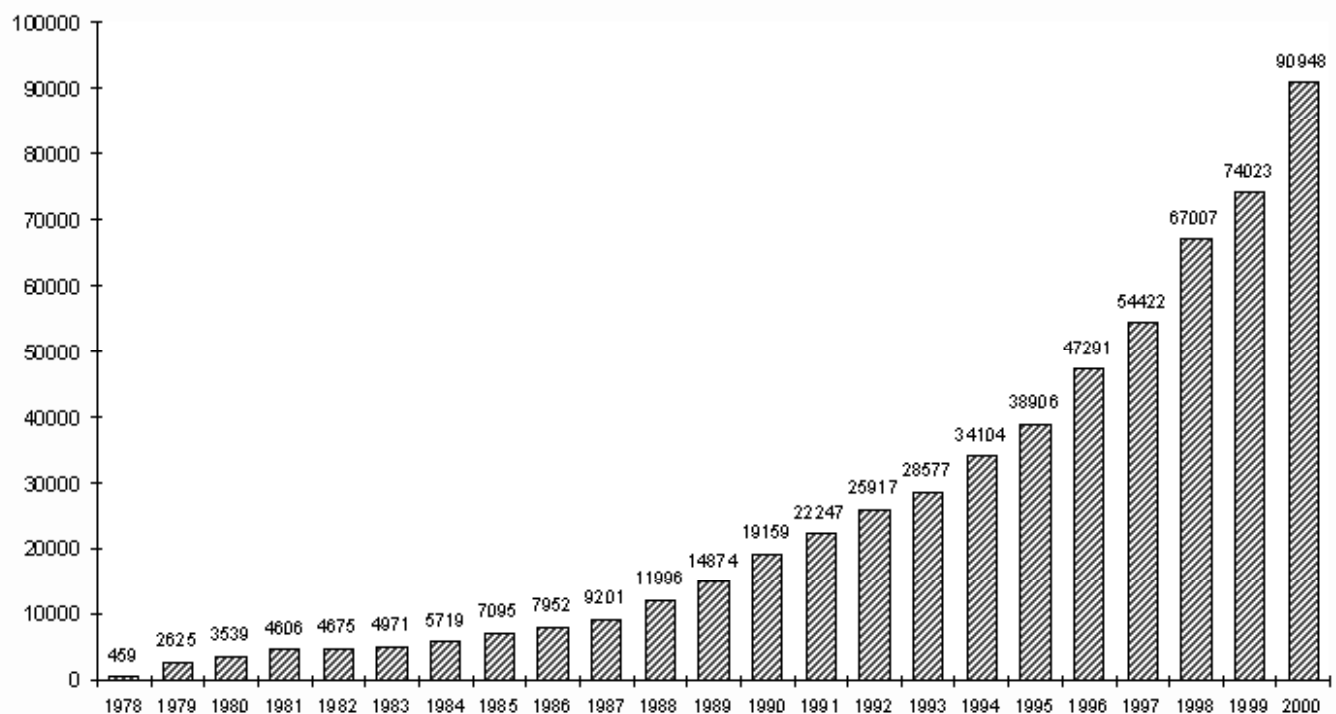
- In the following the method used for the analysis.

- The three major wireless Players have been selected:
  - Nokia 34,8 %
  - Motorola 14,8 %
  - Ericsson 8,3 %

  Their cellular market share is around 60 % (2Q 2001)

- Have been examined the more recent 500 European Applications for each Player.
  For every one has been considered the IPC (International Patent Classification), and the patents have been grouped in family, with the first 4 digit part of the code (the other digits gives more details, but the main content address is maintained).

- A threshold of 10 to the count of patents / family is applied.
  Anyway the patents involved in the analysis is 90% of the applications examined.

- The count of the patents gives the indication of the directions where the major effort is applied.

Number of applications filed	IPC families	Description of families
402	H04Q	Selecting
231	H04L	Transmission of digital information, e.g. Telegraphic communication
213	H04B	Transmission
106	H04M	Telephonic communication
102	G06F	Electric digital data processing
47	H01L	Semiconductor devices; electric solid state devices not otherwise provided for
38	H04J	Multiplex communication
36	G10L	Speech analysis or synthesis; speech recognition
32	H01Q	Aerials
29	H04N	Pictorial communication, e.g. Television
26	H03M	Coding; decoding or code conversion, in general
25	H05K	Printed circuits; casings or constructional details of electric apparatus; manufacture of assemblages of electrical components
21	G11C	Static stores
18	H03F	Amplifiers
16	G01S	Radio direction-finding; radio navigation; determining distance or velocity by use of radio waves; locating or presence-detecting by use of the reflection or reradiation of radio waves; analogous arrangements using other waves
15	H03G	Control of amplification
13	H01J	Electric discharge tubes or discharge lamps
13	H03H	Impedance networks, e.g. Resonant circuits; resonators
12	H01H	Electric switches; relays; selectors; emergency protective devices
12	H02J	Circuit arrangements or systems for supplying or distributing electric power; systems for storing electric energy
10	G08B	Signalling or calling systems; order telegraphs; alarm systems
10	H02M	Apparatus for conversion between AC and AC, between AC and DC, or between DC and DC, and for use with mains or similar power supply systems; conversion of DC or AC input power into surge output power; control or regulation thereof

Families involved in radio use for digital and multimedia communications

H01Q Aerials

H04N Pictorial communication, e.g. Televiison

Ant

Spkr

Mic

2G/3G RF

Analog audio

Ext..Ant jack

Camera
Logic &
Driver

Kybd Logic
& Driver

Display a X b
pixels

Display
Logic &
Driver

DSP

Layer 1 DSP
SW
(Algorithms)

Vocoder

Echo Canceller

G10L Speech analysis or synthesis;
speech recognition

Layer 1 Baseband Circuitry

H03M Coding; decoding
or code conversion, in general

Blue Tooth
Circuitry

Ext. Bus I/O

Battery

Micro Processor

Operating System

L1 SW
L2 SW
L3 SW
MMI

Ext. Co-
Proc I/F

Sys
Mem
Int.

Blue
tooth RF

Power
Mgmt

Co-Proc.

IR Port
I/F

SIM I/F

Ext. Mem
I/F

Mem
.
Card

G11C Static stores

SIM
Card

Ext. Conn.

Charge port

- In this lecture has been highlighted how ideas play a relevant role in the evolution of a technological scenario. And how they are used by the major Players in the wireless market.

- Anyhow the assets presented are not the only one that may be considered.

- If you have some idea or proposal to present, Telit will evaluate it.

  Telit Policy is to promote the concept, investing in its development and consolidation.

  A relevant role is obviously played by the value of the concept in the scenario where applied.

- The result of the steps of this presentation may be summarized in the three AT&T 3G concept phone:
  - AT&T Portable "Kid Talk" Video Conferencing System (2000)   - toddler segment
  - AT&T Portable Internet Gaming Device (2000)   - teen segment
  - AT&T Digital passport (2000)   - adult segment

- AT&T turned to Frog Design, USA, for "Imagine Kit", a study of high-speed wireless communication products. Utilizing a range of emerging technologies that include GPS, wireless networking and digital imaging, the result is a fun exploration into the ways that people will stay connected

AT&T Portable "Kid Talk"
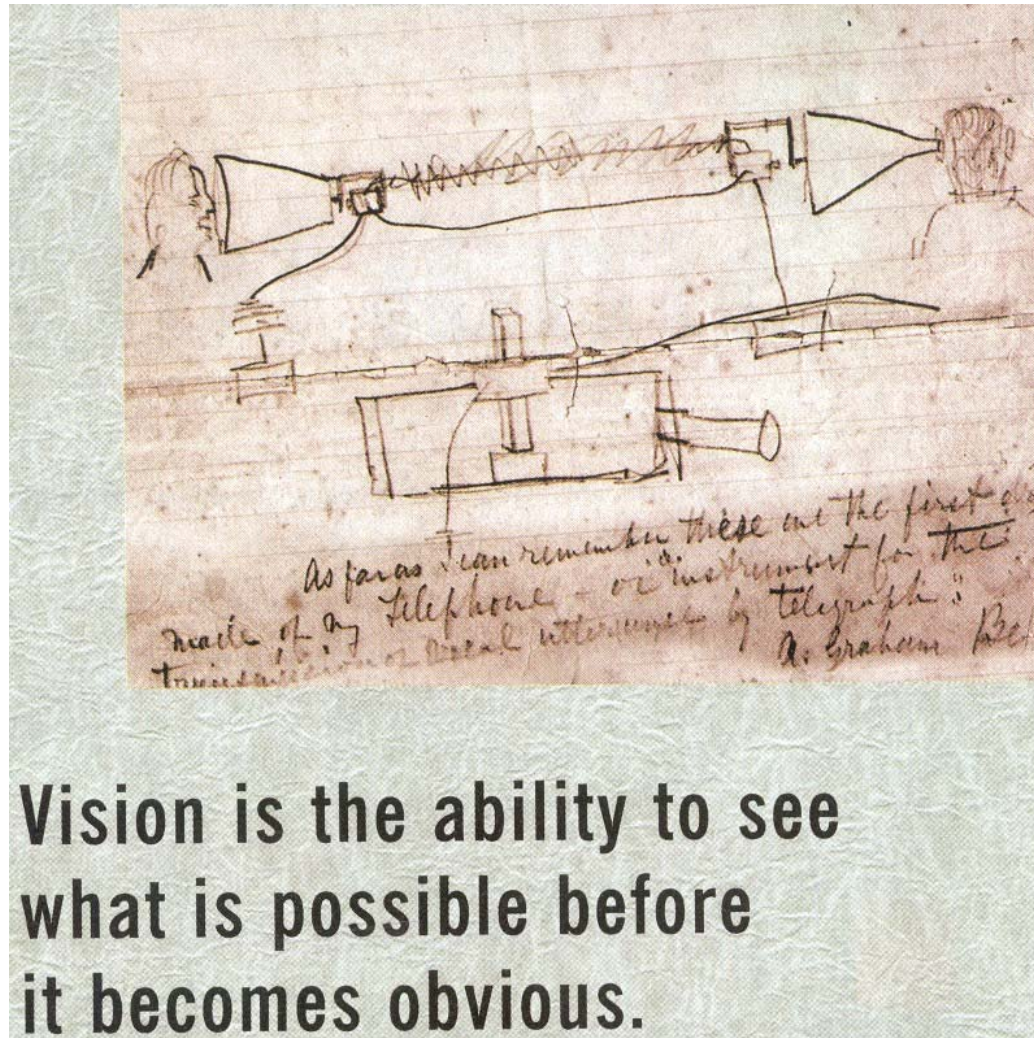Video Conferencing System (2000)
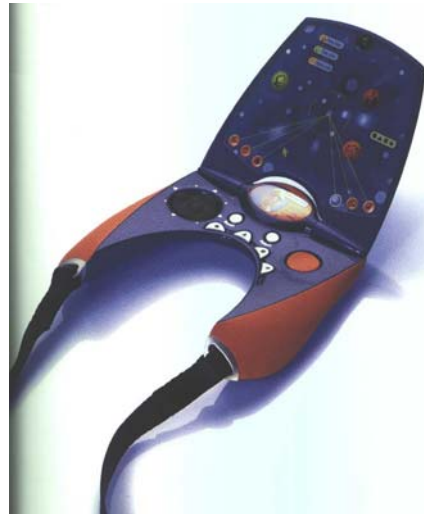
AT&T Portable Internet Gaming Device (2000)

AT&T Digital passport (2000)

- More concepts that interacts must be joined and merged in a common vision.

Vision is the ability to see what is possible before it becomes obvious.