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Content on the move: Storage and applications moving in and out of the house

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Philips Research – Shanghai

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Outline

- Trends
- Waves in Mobile Infotainment
- Key technology areas
- Innovation challenges
  - Technical proof points
- Bringing all together
  - Recent developments and outlook
- Summary and conclusions

Societal trends

Being connected

People are getting used to access at all times to anyone or anything, as well as to being accessible

Individualization

A/V entertainment as a personal experience – customization – my content, sharing content easily

Electronics as fashion item

Expression of oneself in a community

On the move

People spend increasing time, traveling, on holidays, commuting or just going out on their own or with friends

Societal trends

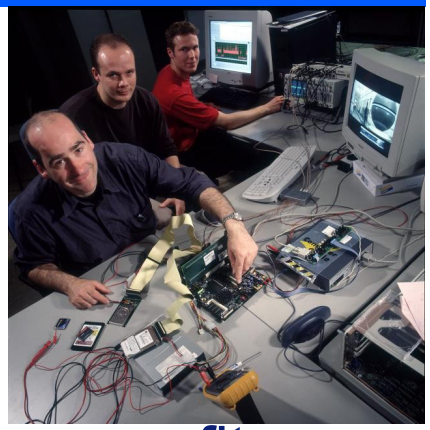
Being connected

People are getting used to access at … o anyone or anything, as well as to being …

People find their mobile phones the most important single thing they want to keep with them all the time. The mobile phone is even more important than the keys or the wallet. If they forget it they go back home, ("*If I'm without money but I have my mobile I can always call somebody to bring me some*").

People spend increasing time, traveling, on holidays, commuting or just going out on their own or with friends

Technology trends



Miniaturization

1980 mainframe storage and computing power now fits in the palm of your hand – powered by 2 AA batteries!

Connectivity

WiFi, GSM, bluetooth, GPS

Digitization

Audio, video, pictures, documents are all ready to take with you or being remotely accessed

Ease-of-use

Automatic play-lists, authoring and editing tools, automatic camera settings, etc., make every consumer a professional content creator and manager

Mobile infotainment: the first waves (till 2007)

First wave: single function products (late 90's)

mobile phone, digital camera, PDA, camcorder, audio jukebox, GPS, camcorder, game pads, …

Second wave: 1st combination products (now)

mobile phone with camera

audio jukebox + PDA

USB key ring with MP3 playback

audio jukebox with ECD service model

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TVLINK
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Philips 7SS
Tag it
Shoot
Scribble
Send
Try out some cool features yourself!
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Do your thing
with Philips GoGear™
Philips GoGear™ Digital Camcorder
Philips GoGear™ Digital Audio Player
Philips GoGear™ Micro Jukebox
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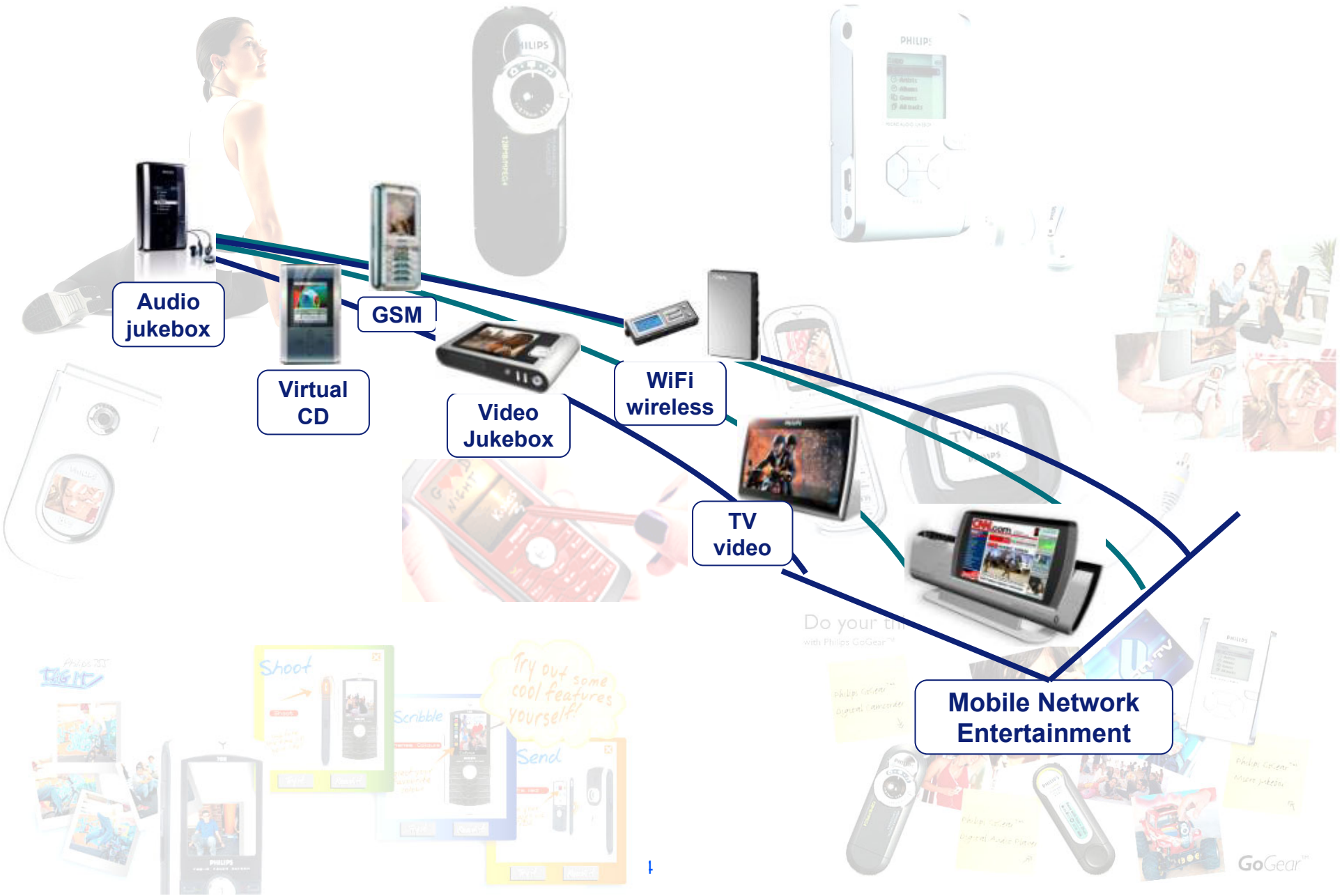

Audio jukebox
Virtual CD
GSM
Video Jukebox
WiFi wireless
TV video
Mobile Network Entertainment

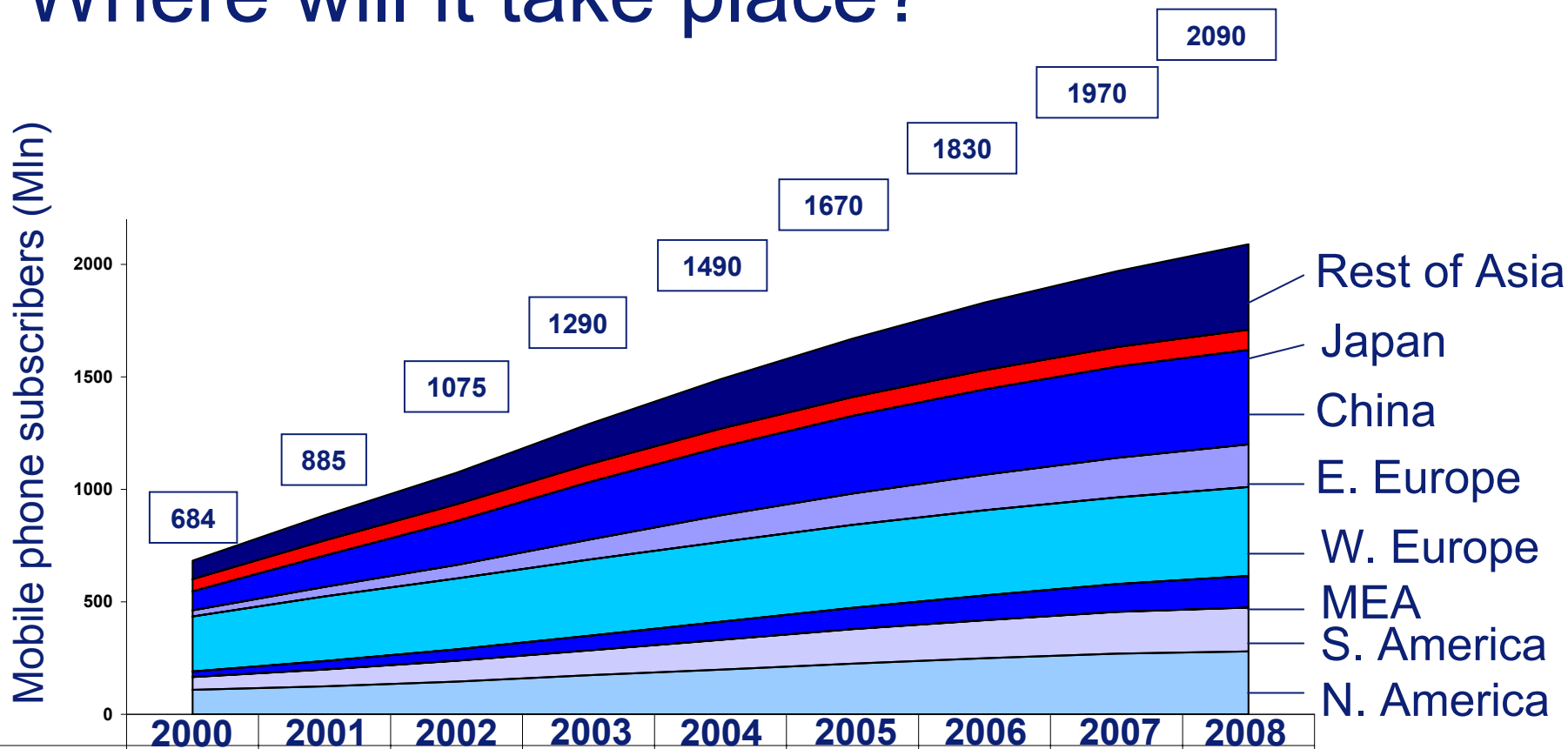
Mobile infotainment: we are just seeing the beginning

Many more waves to come (2007+)**:**

- balanced and smart combinations of functions
- interoperability between devices
- natural migration home ⇔ on the move
- full and open services operational
- standardization

All-in-one *versus* *dedicated solutions*

Where will it take place?



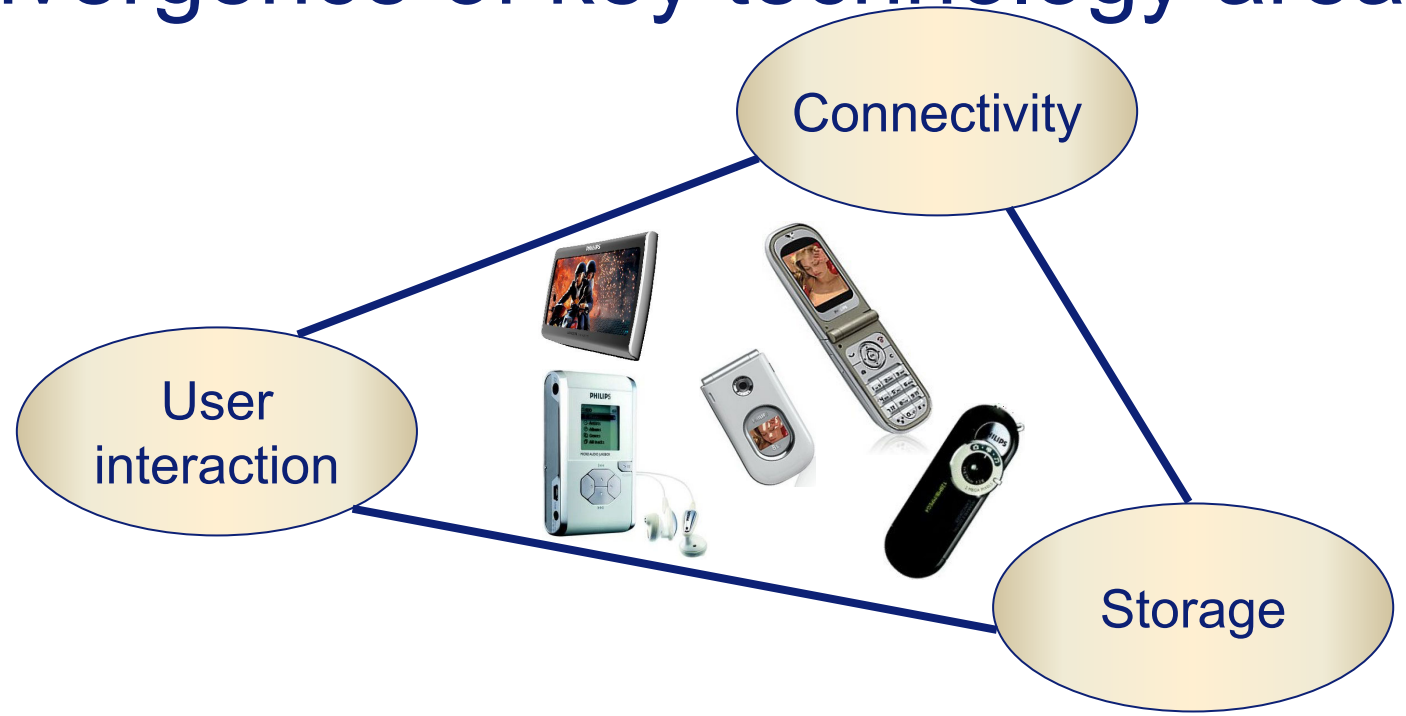
	2000	2001	2002	2003	2004	2005	2006	2007	2008
Rest of Asia	83	112	141	179	220	259	300	337	380
Japan	54	68	74	79	82	84	86	88	90
China	84	139	196	256	303	345	379	405	420
Eastern Europe	28	42	60	89	119	140	158	175	190
Western Europe	244	287	315	338	355	368	378	385	395
MEA	25	37	51	65	80	95	110	125	140
South America	57	76	92	110	132	154	169	185	195
North America	109	124	146	174	199	225	250	270	280

Source: MRT Cellular Team October 2003, based on corrected EMC subscriber figures

Where will it take place?

- Geographically: watch Asia, China in particular
- Center function: Mobile Phone and Mobile TV
  - But watch the niches like high-end cameras
- Markets:
  Youth – Fashion – Entertainment – Business
- Around existing and new application domains
  - Fitness
  - Video telephony
  - Health
  - …

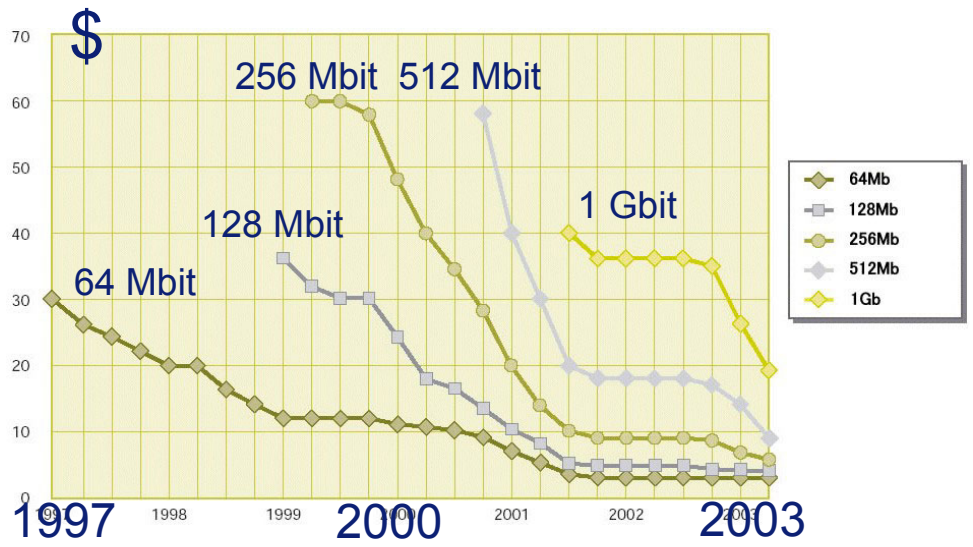
Convergence of key technology areas



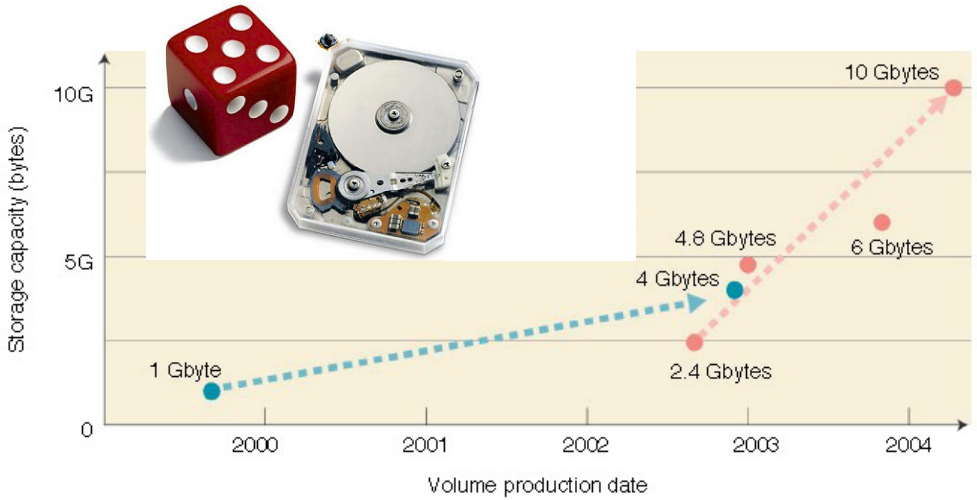
- Key challenge is in the right balance
- Storage as key technology area is often underestimated

Storage choices for mobile applications

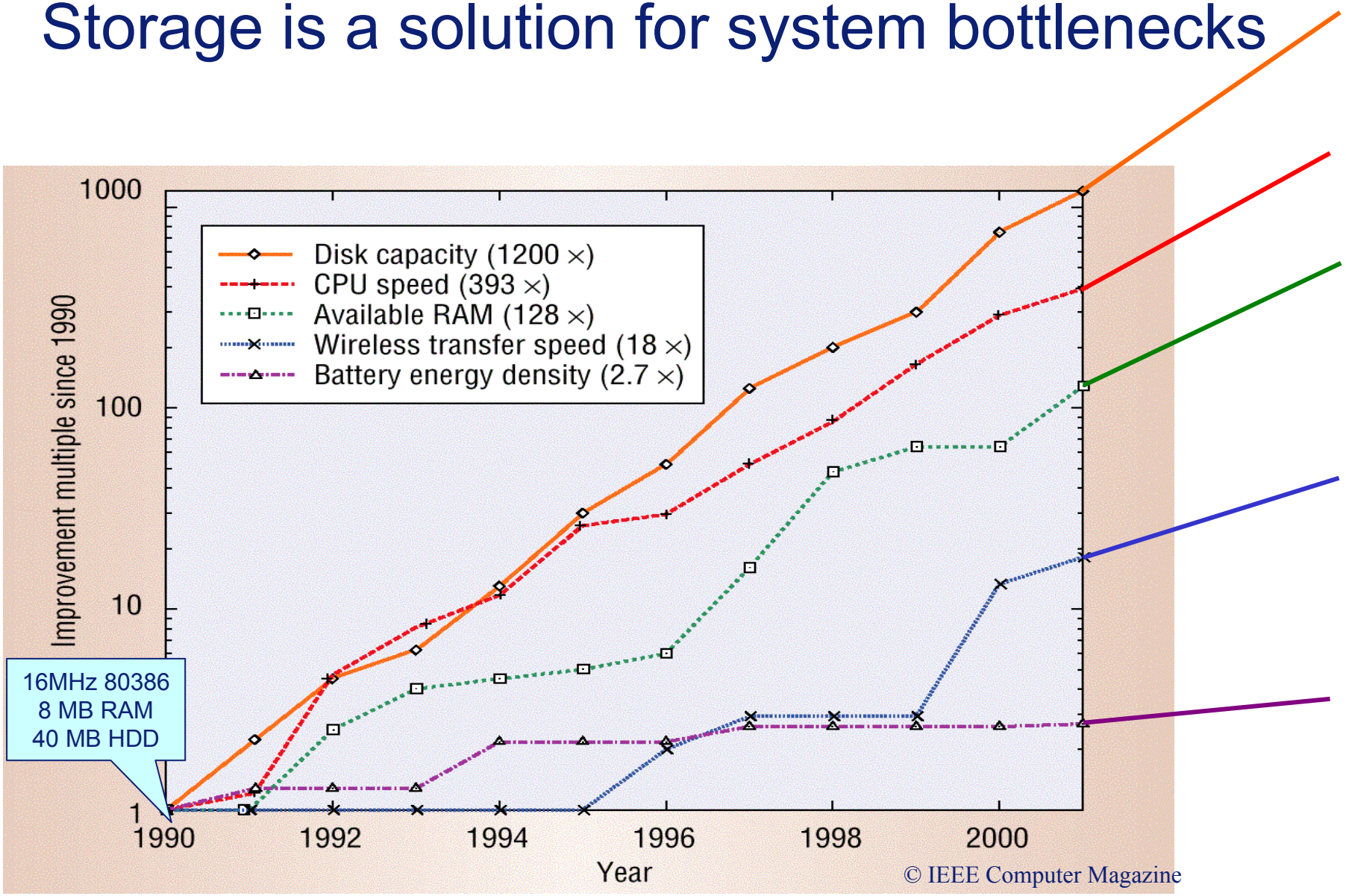
- Solid state
  - Today: 4 GB
  - Capacity doubles yearly
  - Scalable, removable, exchangeable
  - Consumer choice how much to spend
  - Casual storage



- Hard disk
  - Today:
    - 1.8" : 40 GB
    - 1" : 10 GB
  - Best GB/$
  - Mass storage



Storage is a solution for system bottlenecks

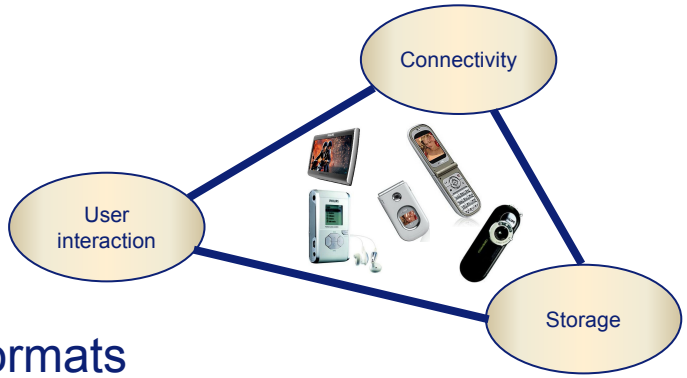


Connectivity choices for mobile applications

- 2G/2.5G/3G/4G
  - Voice and data
- DVB-H/T
  - Mobile TV
- WiFi
  - Connecting to your environment
- Bluetooth
  - Your personal area network
- UPnP
  - Plugging in seamlessly

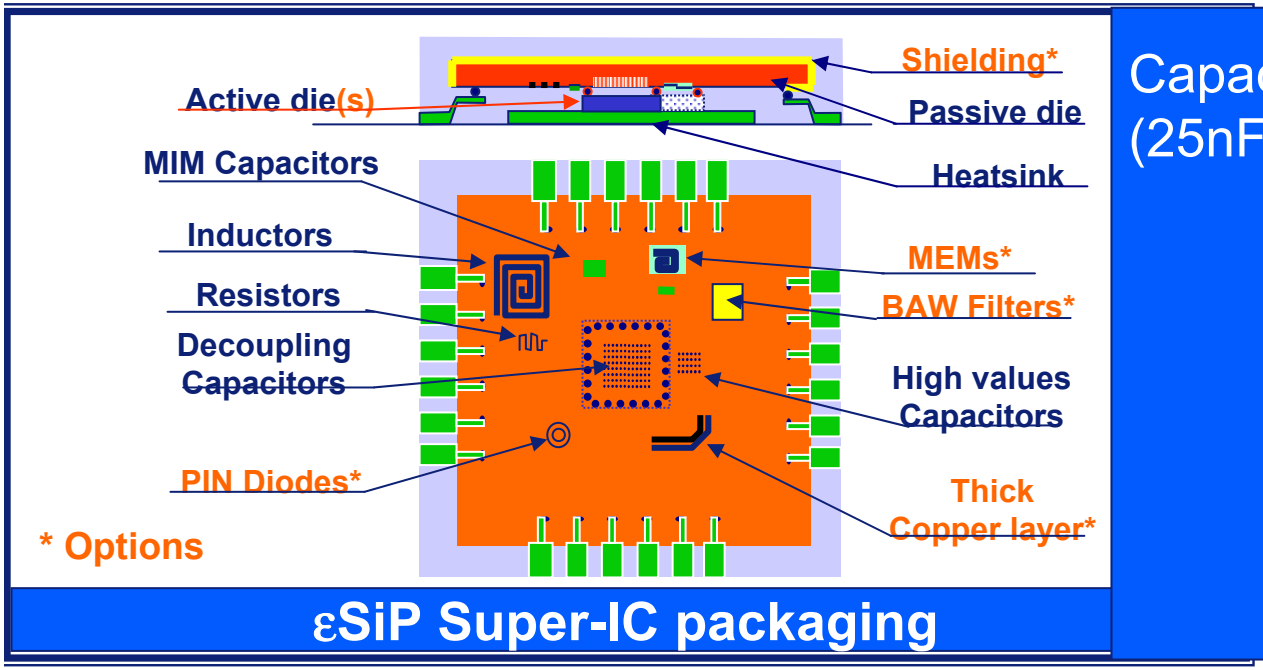
Converging around various applications, e.g. seamless handover

Innovation challenges

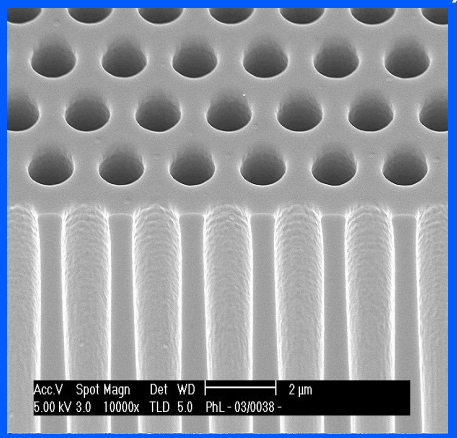


- Interoperability of devices
  - Standardization of connections, protocols, formats
  - Operation in and between different environments
  - Compatibility of storage formats
- Content and media transfer management
  - Caching strategies for “always-connected” experience
  - Content: stored, broadcasted, self-generated and third party
  - Standardization of content description
- System architecture
  - Balance between completeness of functionality and ease of operation
  - Quality of service, low power, component standardization, miniaturization
  - Location of storage in the delivery chain (compare TV-Anytime)
- New business models
- Security, privacy and rights management

Example of innovative approach to technical challenges: Low power Mobile TV solution.

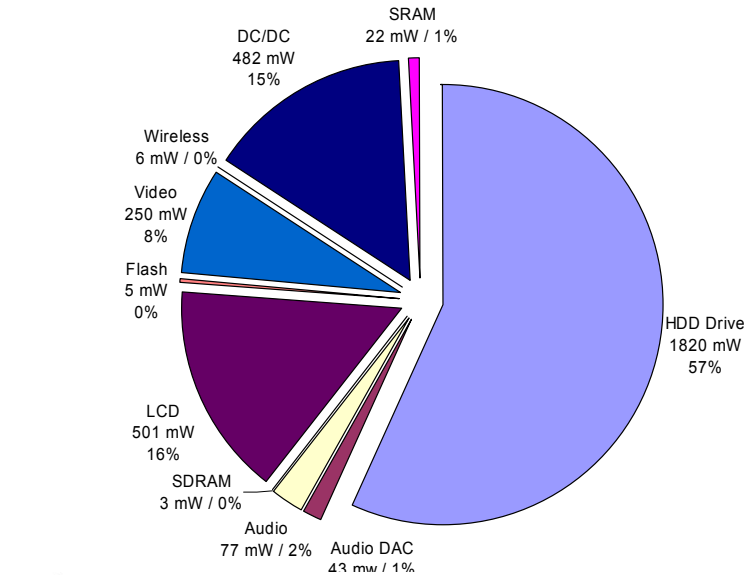


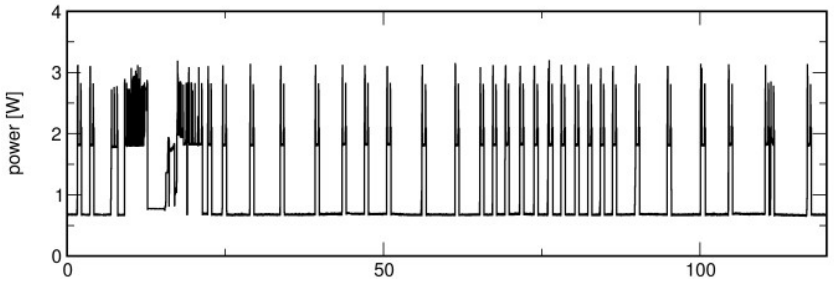
Capacitor Density =world record (25nF/mm² > 100nF/mm²)



- **Mobile TV solution using silicon based system in package (sbSiP) system concept for low power**
  - Actual system solution including adapted packaging , shielding, heat management
  - Key innovation is actual use of 3D Silicon

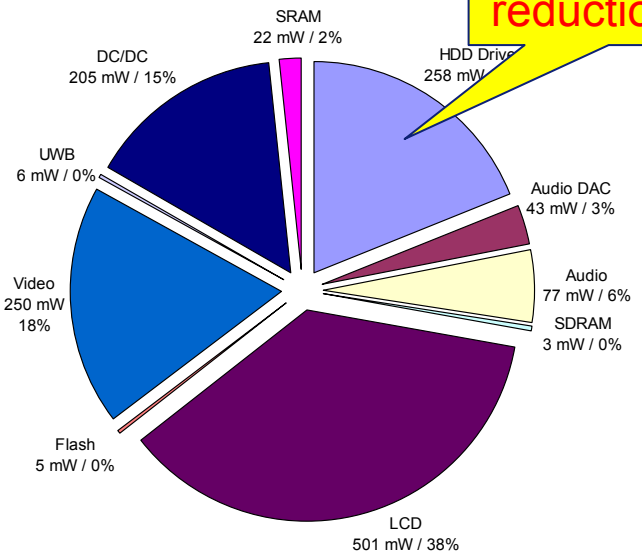
Example 2: Low power HDD scheduling mechanism for multiple stream and best-effort handling

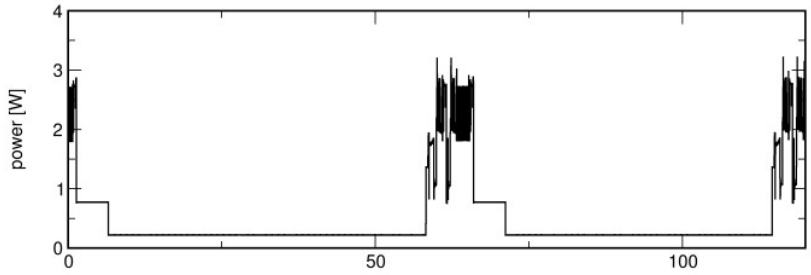




Total Power Consumption: **3209** mW
Without HDD Scheduling

HDD power reduction 85%





Total Power Consumption: **1370** mW
With HDD Scheduling

Total power reduction 57%

The extended home environment:

Home storage vs Storage on the move

1 TeraByte =
400 h of SD video
+ 50 h of HD video
+ 1500 h of MP3 music
+ 100,000 3Mpx pictures

80 GigaByte =
500 5 min video clips
+ 10.000 songs
+ 100.000 snapshots
+ 10,000 3Mpx pictures
+ 500 h of recorded voice

Home storage:
All you have

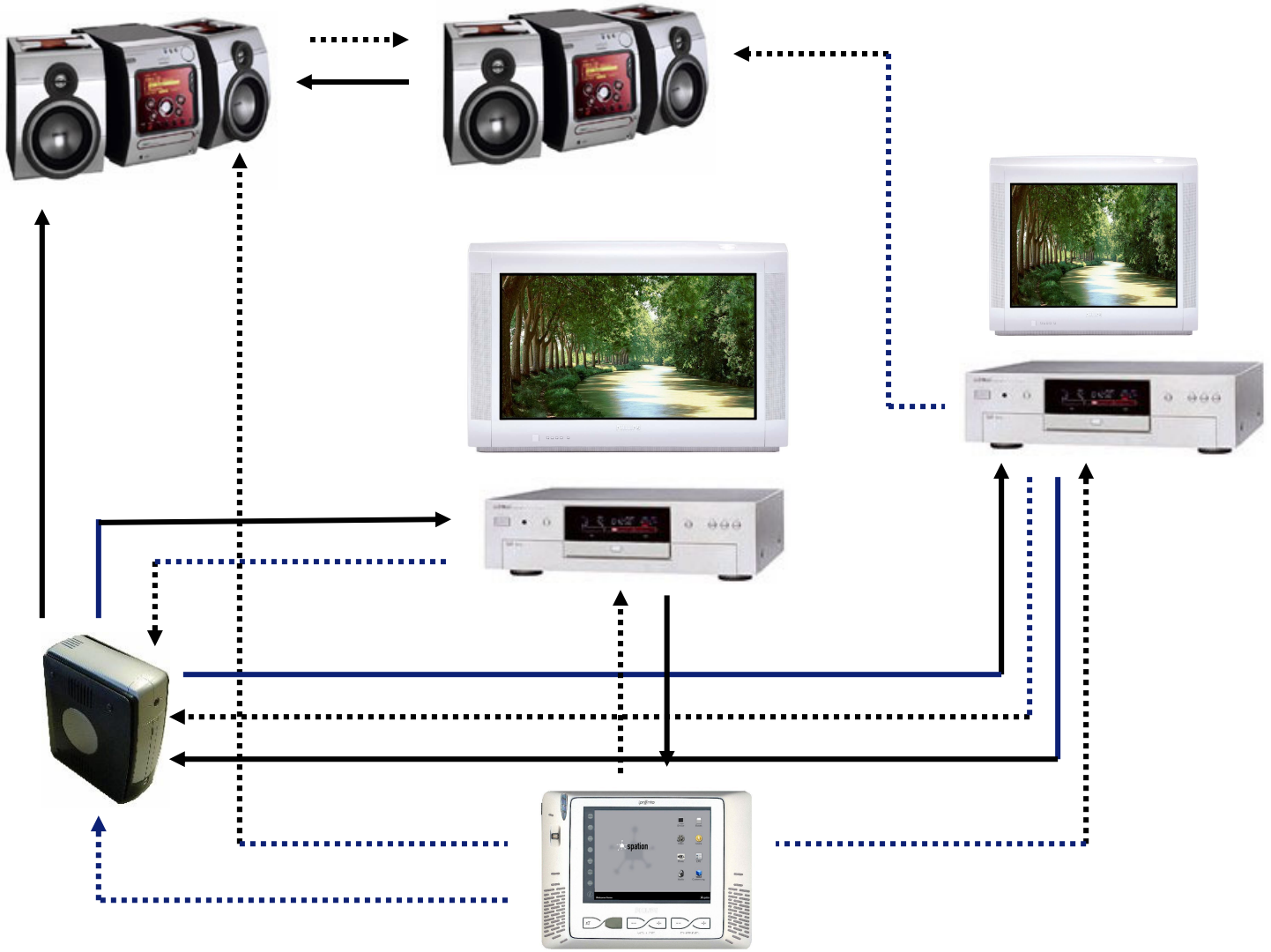
Mobile storage:
All you need

Media

transfer

management

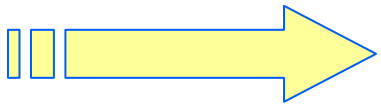
Spation Home network example



Transparent information management

Requirements:

- Not search each device separately
- Obtaining an overview of all content
- Easily searching for photographs, music, video
- Knowing what is stored on devices that are turned off
- Easy archiving
- Organizing content



Meta-data aggregators

- To give the user the experience that from any device all content can be searched

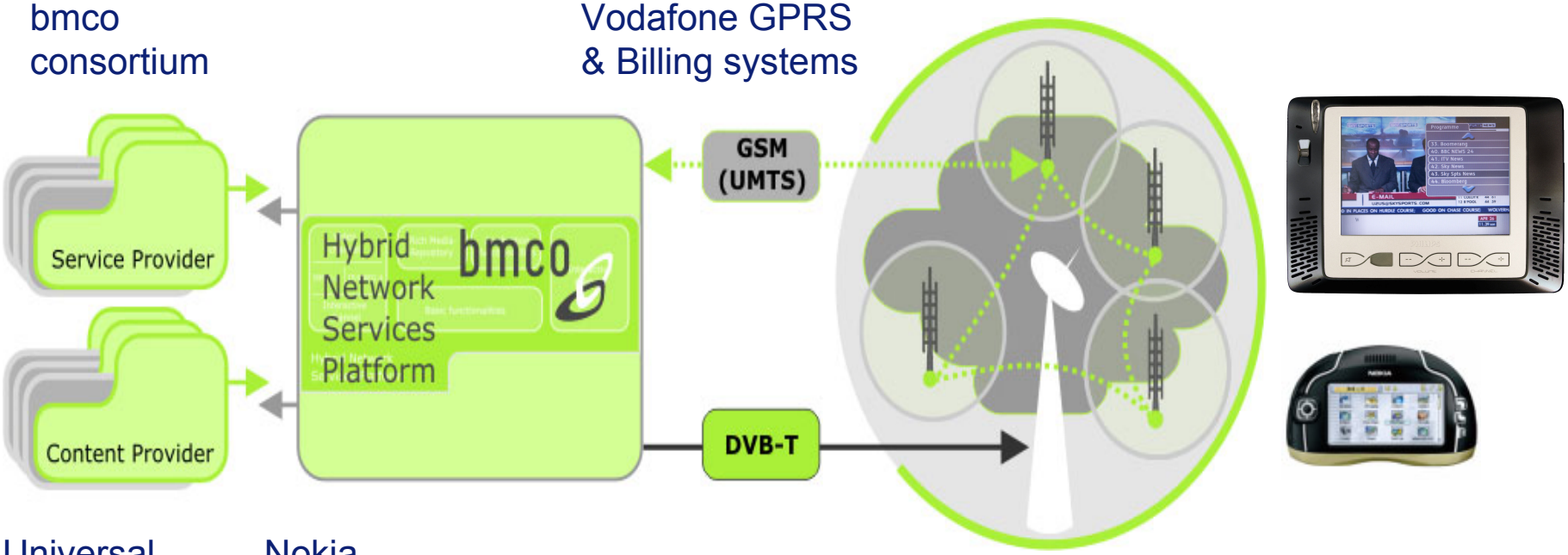
Bringing it all together in the mobile environment

- On the European scale
  - CISMUNDUS and many other IST projects
  - Berlin, Aug 2004: Consortium of key European players:
    - Broadcast mobile convergence (bmco) trial

bmco end-to-end system

bmco consortium

Vodafone GPRS & Billing systems



Universal
Viva
Eurosport
Etc.

Nokia
- H263/AAC encoders
- IP Encapsulator
  - Timeslicing, IPSec, IPCC
- DVB-H mux

Philips
- MPEG4/AAC encoders
- Cryptotec embedded CA system

T-Systems Ch59

Via MABB

Philips HotMan2

Nokia 7700 & SU6

Bringing it all together in the mobile environment

- On the European scale
  - CISMUNDUS and other IST projects
  - Berlin, Aug 2004: Consortium of key European players:
    - Broadcast mobile convergence (bmco) trial
- On world scale
  - Strong European technology base (DVB, GSM, …)
  - New markets
  - New players

Example: PHENIX-SSA

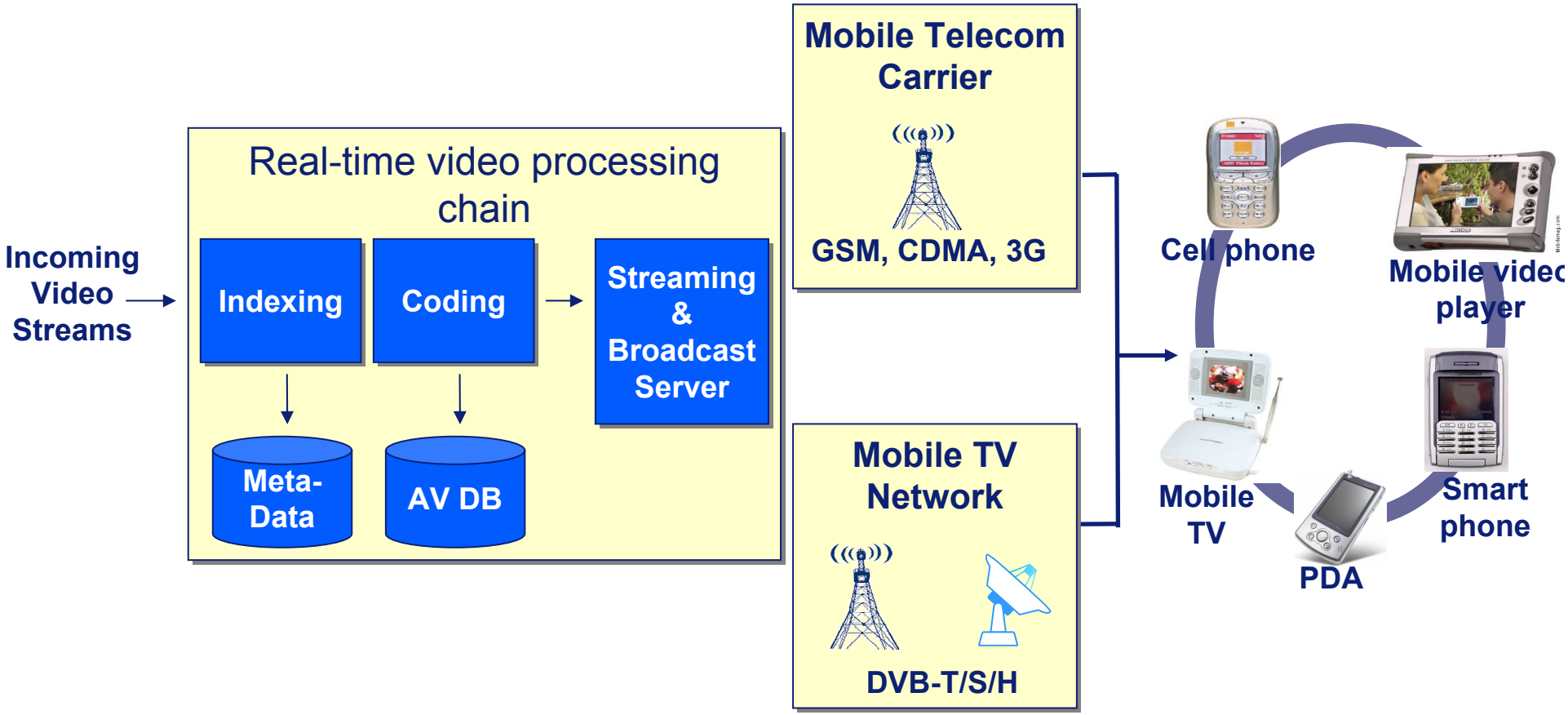
- Specific Support Action under IST 3rd call
- Setting up of a Euro China co-operation for the delivery of innovative multimedia, A/V interactive services towards mobile devices based on DVB and MPEG international standards.
- European and Chinese partners:

France Telecom
Philips
Ecole Centrale de Lyon

China Digital TV Media
China Broadcast Network
China Radio International
TransVideo Digital
2i Technologies

PHENIX:

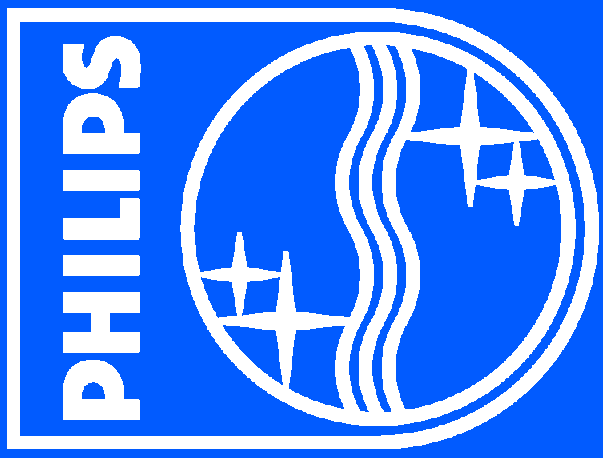
Rich MM services combining DVB-T/H and 3G, experience sharing among community for big events as well as daily life.



An end-to-end system as complete as for home applications

Summary and conclusions

- Mobile consumer environment is in steep development phase
- Drivers:
  - Applications: Community sharing, new services, …
  - Key functions: Mobile TV and Mobile Phone
  - Technologies: Connectivity, Storage and UI
- Preparing for the next waves: system integration
  - Opportunity for Europe to bring together strong technology base and system know-how
  - Opportunity to collaborate on global scale leveraging built-up European knowledge on business models, legislation and standardization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