

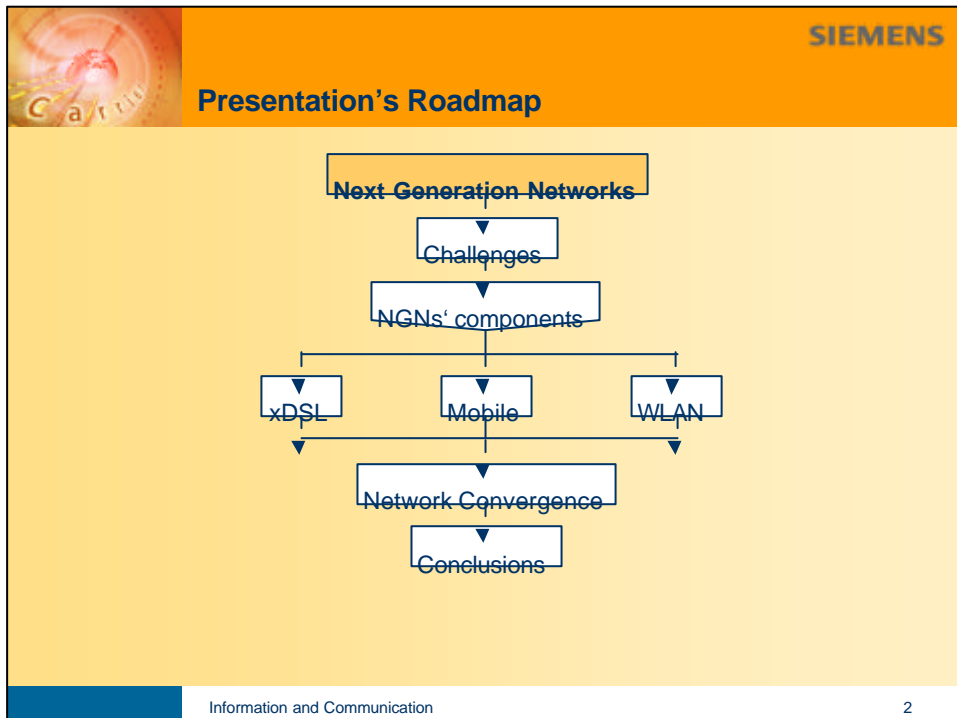
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Information
and
Communication

ITU-BDT Sub-Regional Seminar
on IMT-2000
for CEE and Baltic States
Ljubljana (Slovenia)
1-3 December 2003

Towards
Next Generation Networks

Christoph Legutko
Director Frequency Policy






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Market Drivers
Next Generation Networks

- **Emerging bandwidth-intensive applications and services**
- **Increasingly limited capacity of traditional access networks**
- **Continuing innovations and cost reductions of infrastructure and active equipment**
- **Ability to use existing infrastructure to capture incremental revenues and an accelerated RoI**

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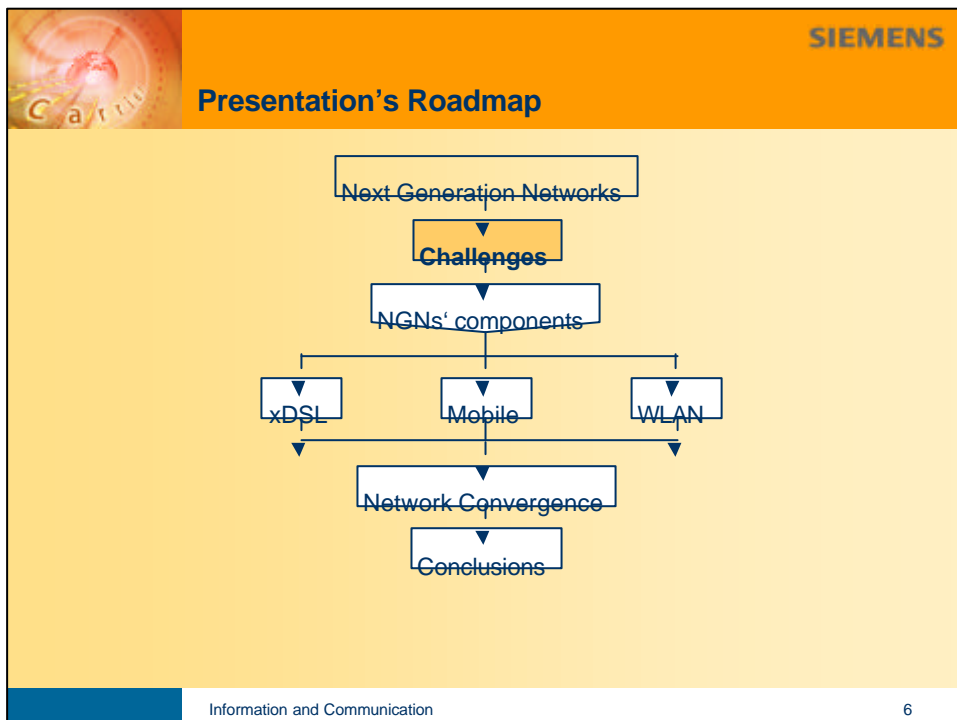
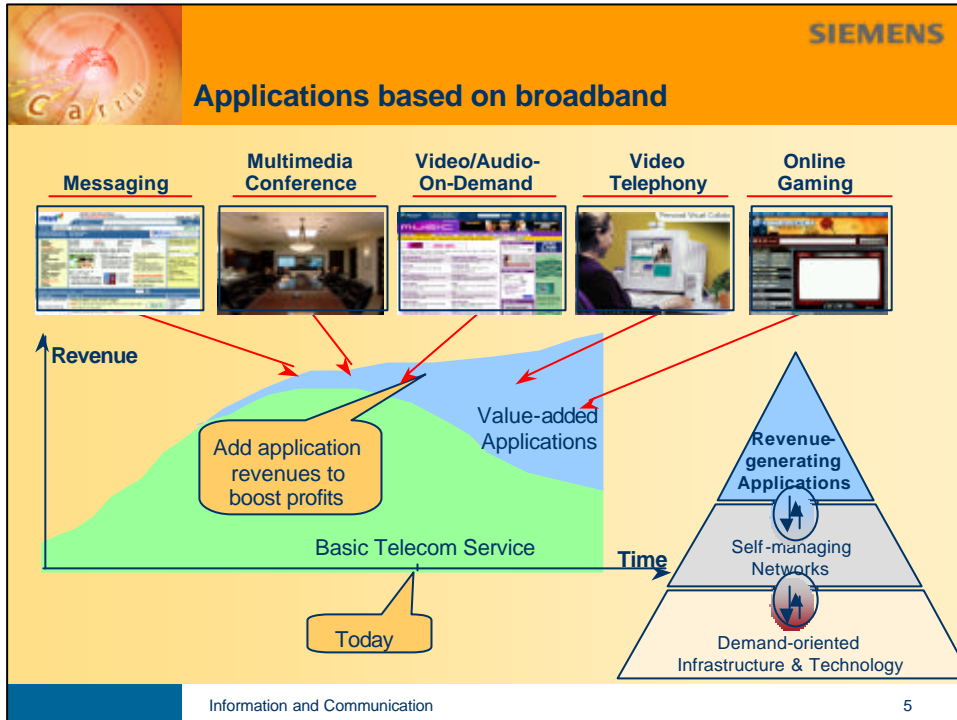


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Market Drivers
Person-to-Person Communication

- **Person-to-Person means:**
 - **Direct user-user communication: voice/video/data**
 - **No store & forward in between**
- **Person-to-Person requires:**
 - **Optimized infrastructures for traffic engineering, QoS and security**
 - **Adaptation and evolution of the PS domain infrastructure for optimized transport**
- **Person-to-Person results in:**
 - **Multimedia traffic (incl. voice) via PS domain**
 - **IMS for End-to-End policy and session control**
 - **Costefficient transport node at Metropolitan Level**

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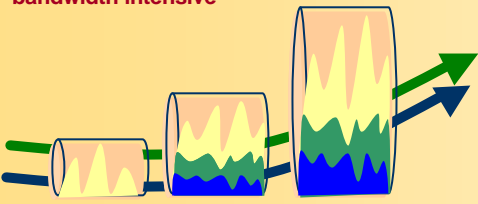
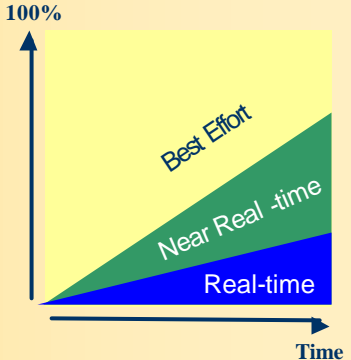
Operator Challenge
Changing Nature of Traffic in the Access

Bandwidth capacity is multiplying

- Deployment of xDSL and Ethernet in the 1st mile

Bandwidth demand is growing even faster

- Peer 2 Peer, Gaming and Video Services are bandwidth intensive

Bandwidth & Demand are both exploding


- Near real-time & real-time traffic puts more stress on the BW
- The nature of traffic is changing to more dynamic with QoS orientation

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Operator Challenge
More Bandwidth = Increased Revenue ?

- Most European operators are loosing money on flat-rate concepts
- Each household has a limited amount of money to spend
- Peer 2 Peer is major driving force (MP3, Movies > 60% of traffic)




- Adding further BW does not resolve the QoS problem, generally worsens it by attracting more QoS-sensitive applications eg. Broadcast Video
- Increased Bandwidth is **NOT** increasing ARPU automatically!




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Operator Challenge Complexities



- Set Top
- DRM
- Encryption
- Piracy in Territory
- Network
- Partners
- Commercial Opportunity

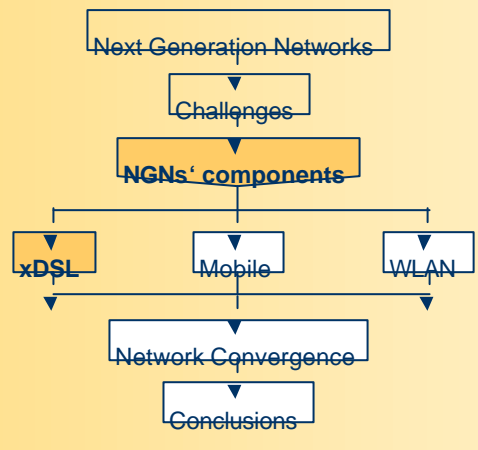


Paradigmen shift	Market unsure	Open MPEG 4 issue
PC or TV centric ?	What is good video quality ?	Business modell ?
Investment delays	Operator role ?	Young market
60+% Hollywood margins	Individual *TV culture* behaviour	Proprietary solutions

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Presentation's Roadmap



```

graph TD
    A[Next Generation Networks] --> B[Challenges]
    B --> C[NGNs' components]
    C --> D[xDSL]
    C --> E[Mobile]
    C --> F[WLAN]
    D --> G[Network Convergence]
    E --> G
    F --> G
    G --> H[Conclusions]
    
```

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Online Gaming

Total Worldwide Revenues & Data Transfers for Online Gaming

Year	Data Transfers (Petabits per)	Online Gaming Revenues (\$ in Billions)
2002	~10	~0.2
2003	~20	~0.3
2004	~40	~0.5
2005	~80	~0.8
2006	~150	~1.5
2007	~300	~2.5

Source: In-Stat/MDR 3/03

Worldwide Total Broadband Access Subscribers Forecast

Year	Subscribers (Millions)
2001	~35
2002	~45
2003	~60
2004	~80
2005	~100
2006	~140

Source: In-Stat/MDR, 6/02

Drivers :

- Interaction demand in home entertainment.
- Customer awareness of gaming.
- Widespread adoption of broadband access.

Challenges :

- Closer collaboration between service providers, operators and equipment vendors.
- Availability of universally acknowledged online gaming platforms and business models.
- Integrated online gaming devices.
- Increasing bandwidth demand for telecom infrastructure.

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Video-on-Demand

Worldwide Telco Video Subscribers

Year	Subscribers (Units in Millions)
2002	~0.5
2003	~1.0
2004	~2.0
2005	~4.0
2006	~10.0
2007	~20.0

Source: In-Stat/MDR 3/03

Worldwide Cable VOD Subscriber Forecast

Year	Subscribers (Millions)
2001	1
2002	3
2003	5
2004	7
2005	9
2006	11

Source: In-Stat/MDR 12/02

Worldwide VOD Revenue Share by 2006

Region	Share (%)
North America	43.2%
Europe	27.1%
Asia	15.0%
Others	14.7%

Worldwide Consumer VOD Over IP Network Revenue Forecast


Year	Revenue (US \$ Billions)
2002	0.5
2003	0.7
2004	1.0
2005	1.5
2006	2.0


Source: In-Stat/MDR, 5/02

Challenges :

- Competition from Cable TV operators, whose VOD subscriber base will increase from current 3 million to over 11 million by 2006 (source: InStat 02).
- Regulatory policy, in some regions.
- Availability of mass telco broadband access.

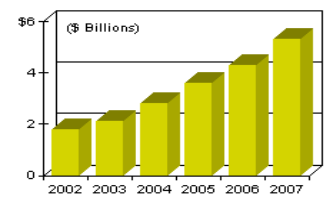
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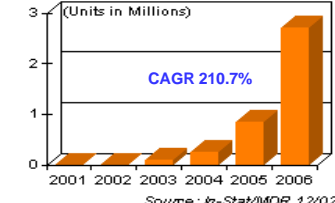
Home Networking

WorldWide Home Networking Revenues



Source: In-Stat/MDR 3/03

Worldwide Multimedia Home Network Household Forecasts



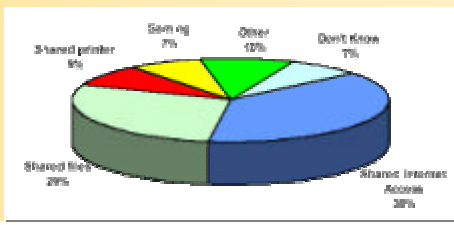
Source: In-Stat/MDR 12/02

Drivers :


- Broadband sharing – the biggest driver over the past three years.
- Increasing adoption of networked gaming and video/audio-on-demand, iTV services.
- Increasing number of IT-enabled household appliances.


Networked home entertainment will become the biggest driver of home networking over next 5 years!

And online gaming console will become the biggest home networking product!

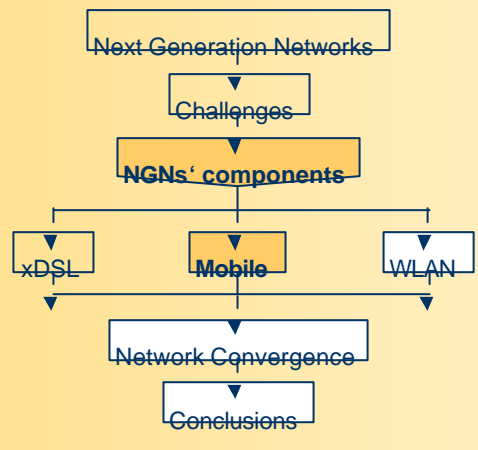


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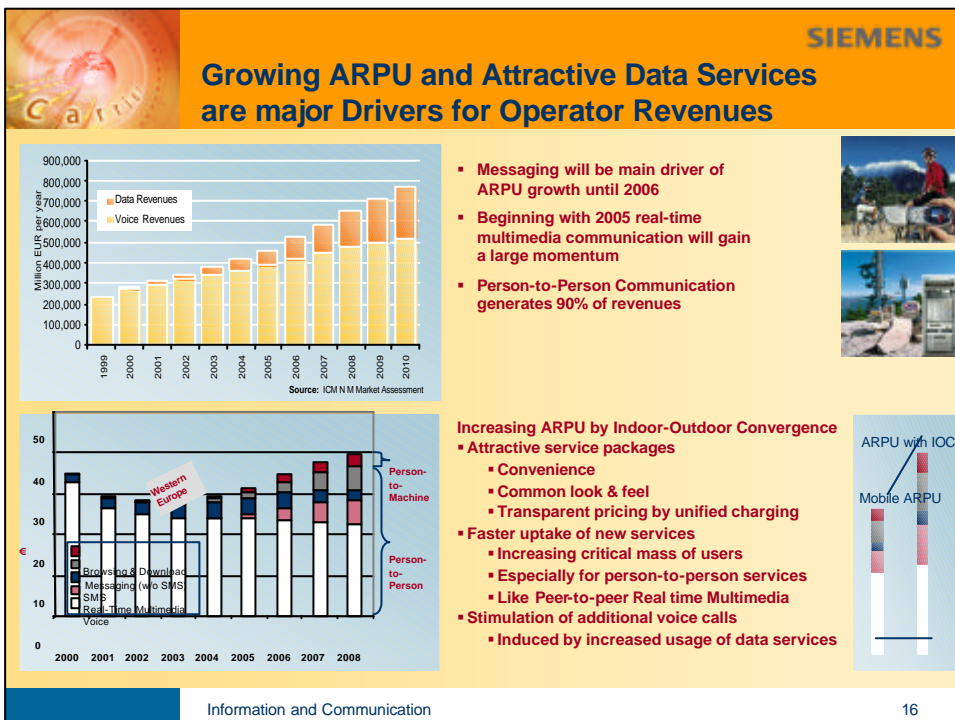
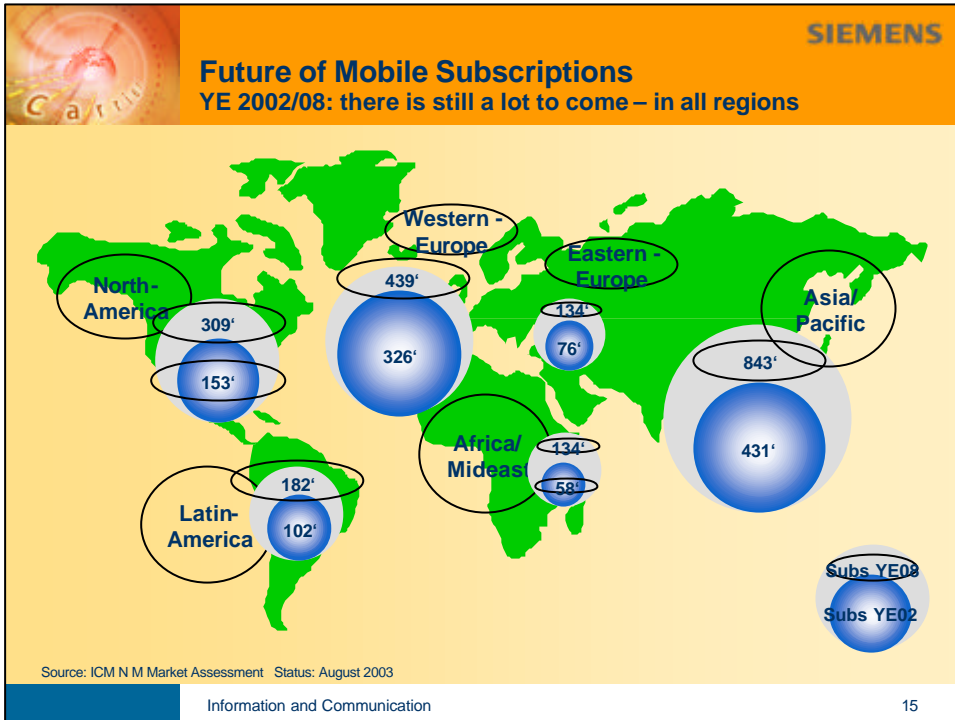
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```

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14



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Acceptance of Mobile Data Services

Prerequisites for Successful Mobile Data Services:

- Personalized and highly customized
- More individual bandwidth
- Always-on
- Global roaming
- Seamless network, UMTS-GPRS-GSM
- Rich multimedia services:
Information, transaction, entertainment

β

my services, anytime, anywhere, on my device

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**The Future has already started:
many mobile data services can be deployed today**

Provided service

10 kbps 100 kbps 1 Mbps 10 Mbps

- Many data services are also possible with 2.5G but only 3G allows for sufficient simultaneous service of users
- 3G delivers seamless services from narrowband to broadband and will support flexible bandwidth on demand up to 2 Mbps per cell

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```

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WLANs

World-wide WLAN Hot Spot Service-Revenues and Users

Year	Service Revenues (bn \$)	Public Users (mil Users)
2002	~0.4	~2
2003	~1.0	~8
2004	~1.8	~15
2005	~2.8	~22

Source: ICM N M

World-wide WLAN Vendor Revenues (bn \$)

Year	Public (bn \$)	Home (bn \$)	Enterprise (bn \$)
2002	~1.5	~0.3	~0.1
2003	~1.8	~0.4	~0.2
2004	~2.2	~0.5	~0.3
2005	~2.8	~0.6	~0.4

Strategic Keys

- Public:** Market Education for mobile data
- Home:** Convergence for voice and data
- Enterprise:** Complementmentation of IT Infrastructure

The strategic importance of WLAN dominates the wireless Industry as revenue potentials are moderate for vendors and their customers like MNOs

“We have a black zero business case, but we need to be in the driver seat for mobile data to keep competition (FNOs, ISPs) out”

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Wireless must trade-off Throughput for Mobility & Range

- Mobile radio access networks are designed to meet certain maximum requirements for grade of mobility and range
- WLANs are designed for high data rates, low ranges and generally low mobility

Mobility & Range

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WLAN and 3G will be complementary

- WLAN provides a viable cordless data solution for quasi stationary use:
 - for corporate and campus scenarios
 - for nomadic (business) users in the public hotspot environments
- The coupling of WLAN and cellular should be as „soft“ as possible in order not to overburden the individual systems
- Economies of scale rely on mainstream WLAN technology; proprietary solutions destroy the power of the embedded base

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```

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The subscriber ...

... wants it cheap, wants it now and wants to choose:

- to get one Bill, one Number
- to stay in close contact
- to check one mailbox instead of many
- to communicate immediately in real-time
- to communicate cheaply
- to communicate with many people who are using different media at the same time

Loss
of subscriber loyalty

Increase
of subscriber knowledge

Increase
of subscriber sovereignty

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Ten Convergence Commandments: the operators dilemma

- I. There is the need to invest in SIP based VAS to **improve revenues**
- II. The standards are not ready but **interoperability** is crucial
- III. Addressing of **fixed and mobile subscribers** is necessary
- IV. **ONE investment** should cover fixed and mobile needs
- V. Avoiding the wrong investment today ...
- VI. ... and there is a need to **invest right now** to avoid customer churn
- VII. **3GPP compliance** is inevitable...
- VIII. ... and **features** of fixed networks **are also required**
- IX. IETF SIP and 3GPP SIP must be supported...
- X. ... and interoperability with the existing infrastructure is necessary

Indoor – Outdoor Convergence (IOC) seems to meet all these demands


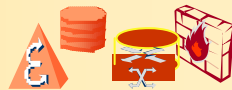

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An increased demand for IOC

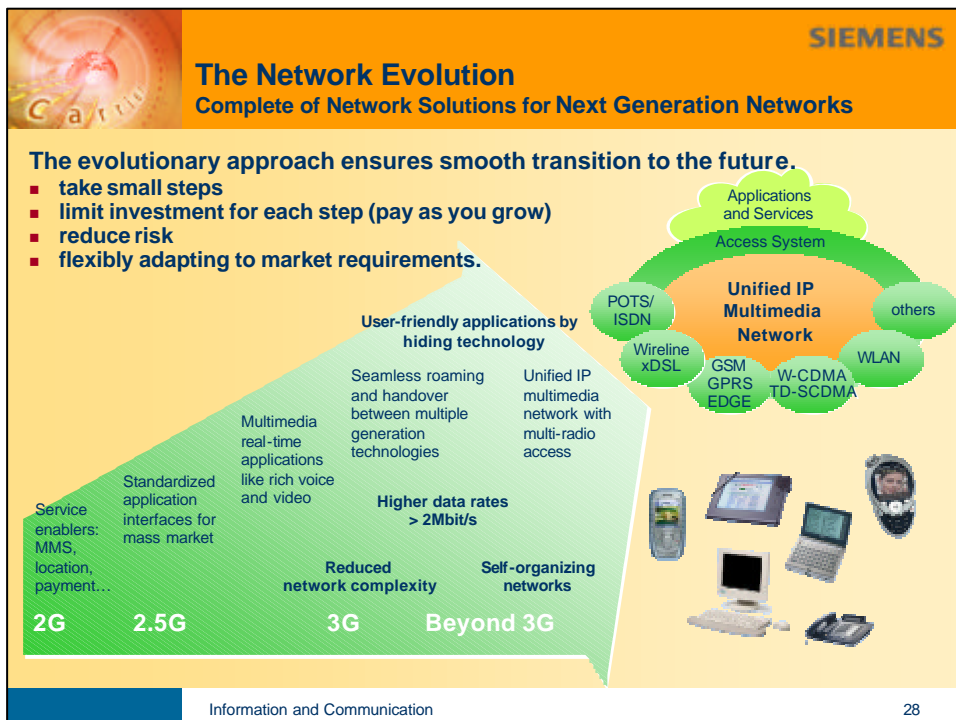
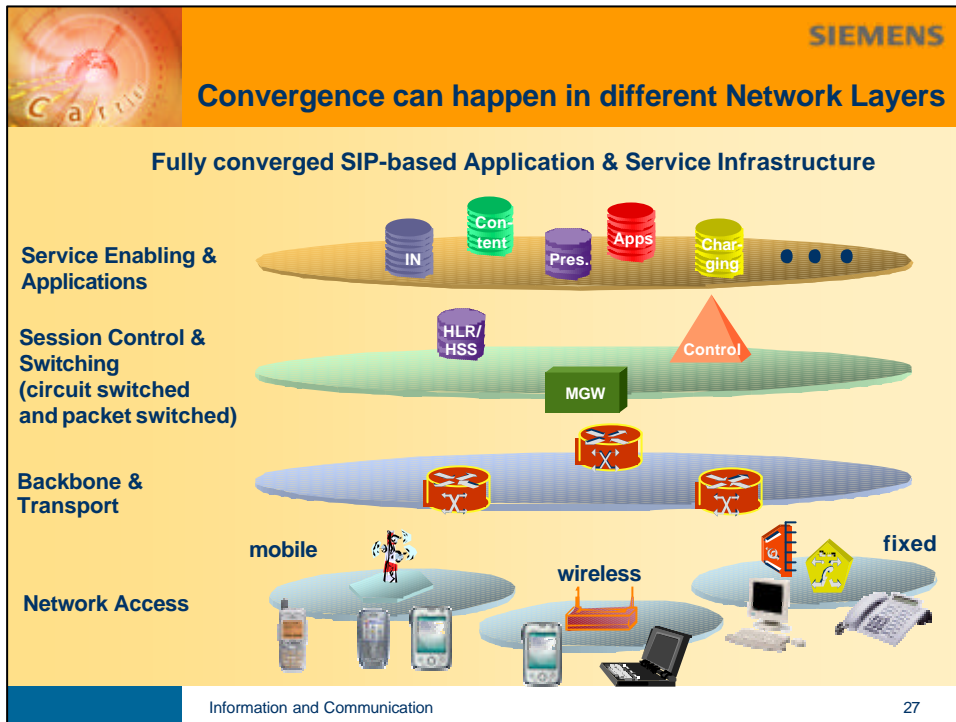
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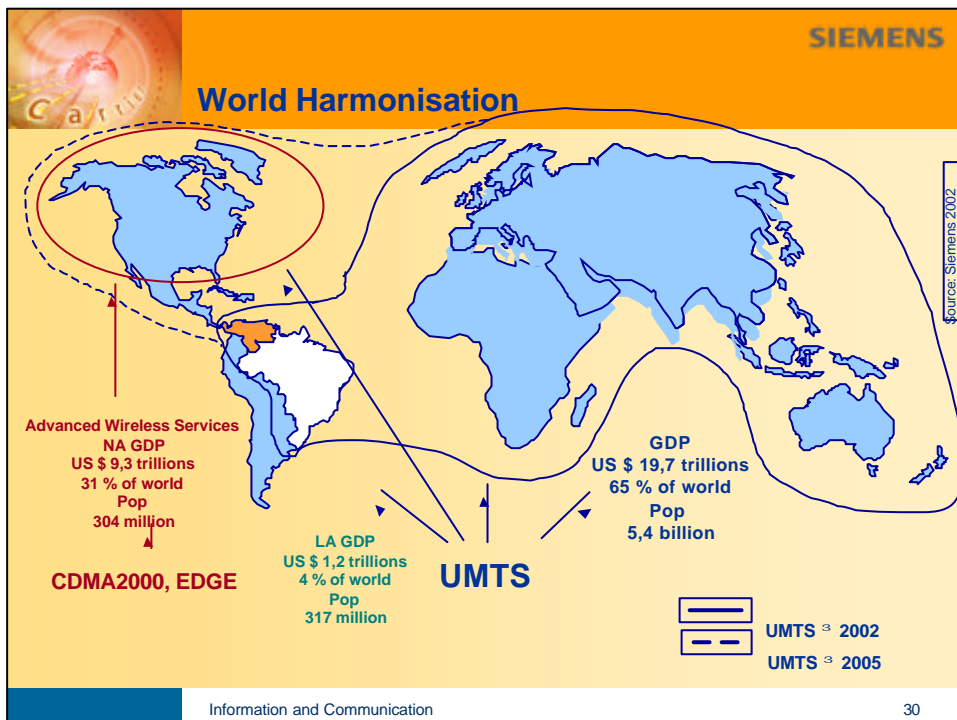
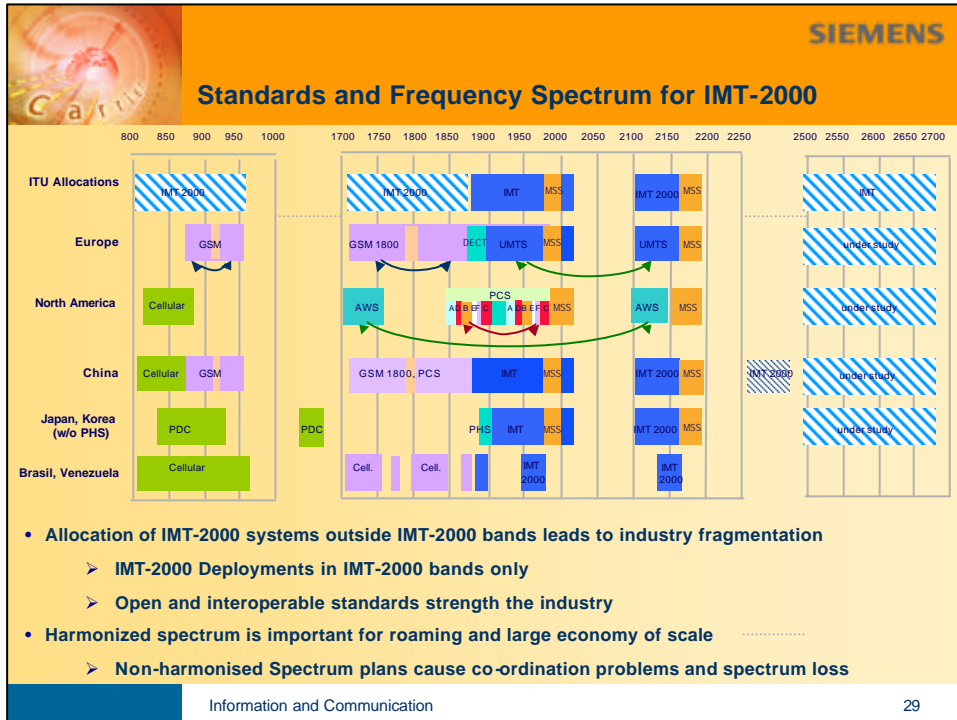
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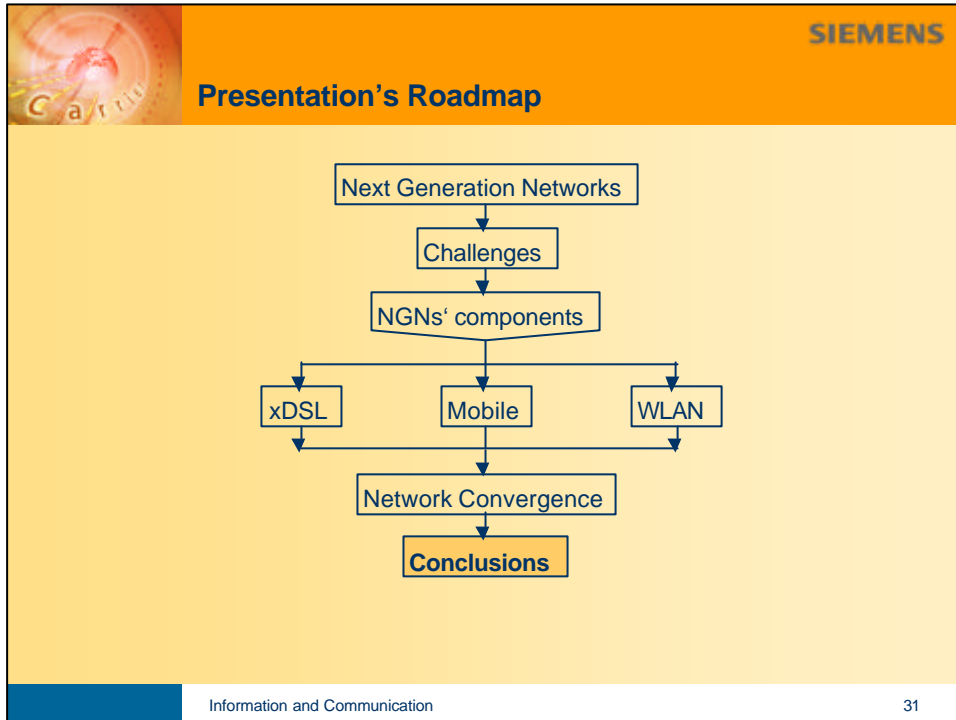
Different Categories of Convergence in the I&C world

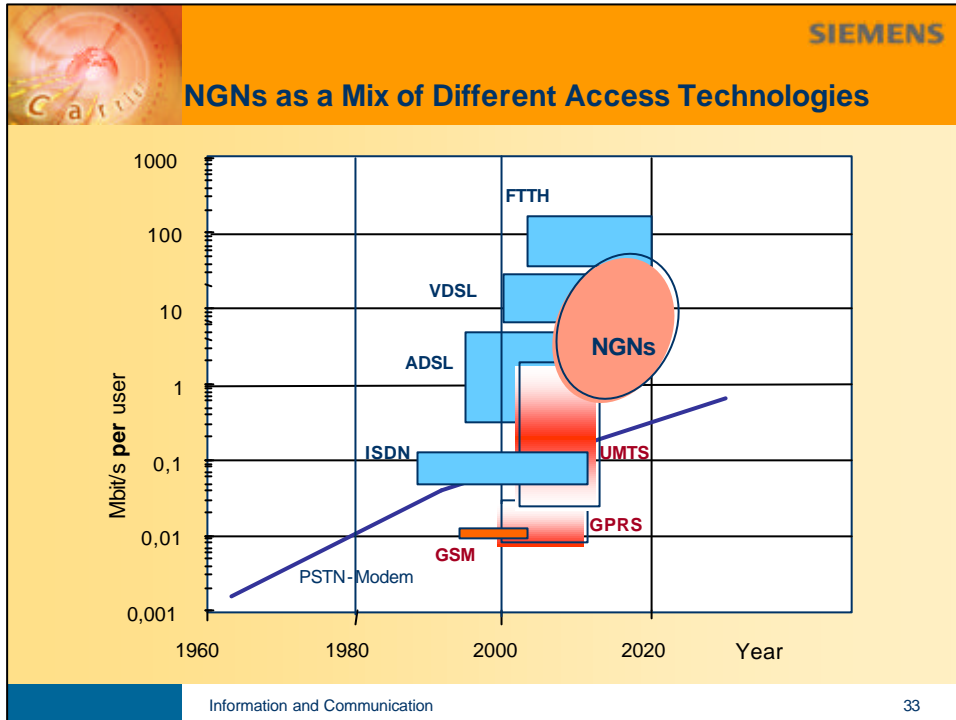
- **Service Convergence**
 - same service offering for fixed and mobile user access (e.g., SMS / MMS, multimedia conferencing, gaming)
 - universal numbering
 - one bill
- **Product Convergence**
 - common application server
 - common service enabling solution (incl. charging)
 - common session control
 - common interworking functions
- **Network Convergence**
 - common core network (control, user and transport plane)
 - common operation
 - support of any access network

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All-IP: ...hype or necessity?

Hybrid networks rule today in for long time

- High OPEX
- Service convergence slow
- Service evolution slowed-down by the hybrid infrastructure (physical, logical and operational)
- Slow terminal equipment price erosion in hybrid environment

=> It is a must, to come to a common denominator:

- IP infrastructure
- IP control (SIP)
- IP-based terminals
- IP-based services

All-IP is necessity to decrease overall communication costs

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Summary / Conclusion

- **Telecommunication market is here to stay as growth engine of global economy**
- **Open and interoperable standards strength the industry**
- **Harmonized spectrum is important for roaming and large economy of scale**
- **Generating new revenues is still the major challenge**
- **Customers like the variety of services, but not the burden of technology details**
- **Seamless inter-operability of multiple interfaces provides the optimal response to the end-users needs**
- **Migrating towards customer centric networks: solid steps, solid performance and solid reliability**

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Thank You for Your Attention

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Siemens AG
Information and Communication
Mobile Networks
Product Generation

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Frequency Policy

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Mail christoph.legutko@siemens.com

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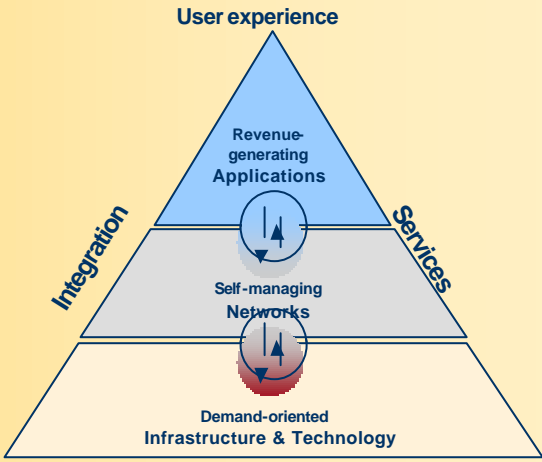


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Deploying Profitable Multimedia Networks

Operators' needs:

- New revenues
- Optimized utilization of networks
- Efficient infrastructure



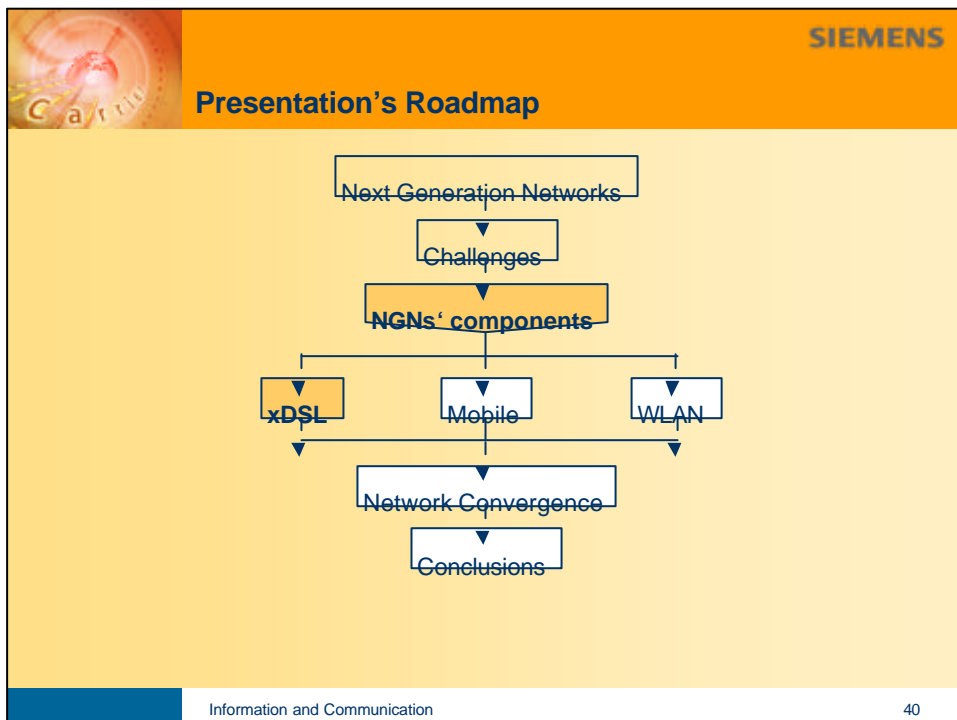
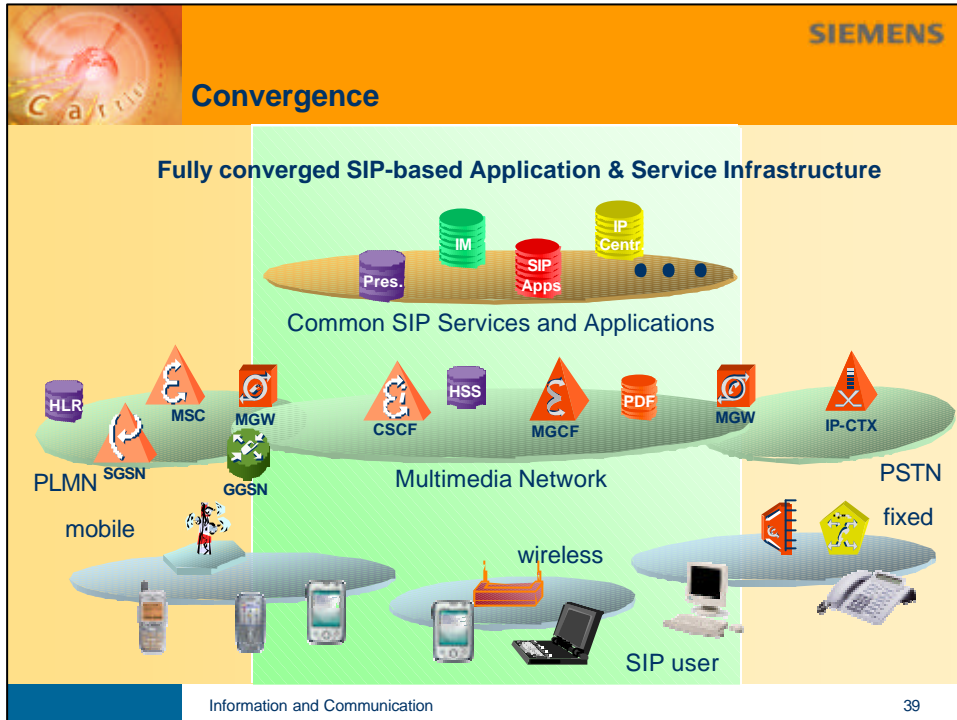
User experience

Revenue-generating Applications

Integration Services

Self-managing Networks

Demand-oriented Infrastructure & Technology



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Online Gaming Market Overview

Total Worldwide Revenues & Data Transfers for Online Gaming

Year	Data Transfers (Petabits per)	Online Gaming Revenues (\$ in Billions)
2002	~10	~0.2
2003	~20	~0.4
2004	~40	~0.7
2005	~80	~1.2
2006	~150	~2.0
2007	~300	~3.5

Source: In-Stat/MDR 3/03

Market :

- Asia-Pacific is leading the world online gaming market with total subscription revenue of US\$533 million in 2002 (source: IDC May 2003)
- South Korea and Taiwan form two of the world's largest online gaming markets. (source: IDC May 2003)
- In 2002 roughly 9% of the total traffic over US backbone are due to online gaming. (source: Instat 2003)

Drivers :

- Interaction demand in home entertainment.
- Customer awareness of gaming.
- Widespread adoption of broadband access.

Challenges :

- Closer collaboration between service providers, operators and equipment vendors.
- Availability of universally acknowledged online gaming platforms and business models.
- Integrated online gaming devices.
- Increasing bandwidth demand for telecom infrastructure.

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Online Gaming Broadband is changing the landscape of Gaming

Game Console Forecast

Year	Shipments (Millions)
2001	~35
2002	~40
2003	~45
2004	~48
2005	~45
2006	~55

Source: In-Stat/MDR 9/02

Status :

- With more and more video gaming becoming online, more powerful CPU and high speed internet access are mandatory !
- Online gaming grant people purely new "social interaction", chatting together, fighting together, trading together and even getting married ! All online!

Worldwide Total Broadband Access Subscribers Forecast

Year	Subscribers (Millions)
2001	~25
2002	~40
2003	~60
2004	~80
2005	~100
2006	~130

Source: In-Stat/MDR, 6/02

Trend :

- Worldwide broadband subscribers will surpass 130 million by 2006 (source: In-stat/MDR 6/02)
- Video game console market reached 31.8 million units in 2001 while all top 3 gaming console makers, i.e. Sony, Microsoft and Nintendo have declared their online gaming plan to ensure further growth. (source: In-stat/MDT9/02)

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Video-on-Demand Market Overview

Worldwide Consumer VOD Over IP Network Revenue Forecast

(US \$ Billions)

Year	Revenue (US \$ Billions)
2002	0.5
2003	0.7
2004	1.0
2005	1.3
2006	2.0

Source: In-Stat/MDR, 5/02

Worldwide VOD Revenue Share by 2006

Region	Share (%)
North America	43.2%
Asia	37.1%
Europe	15.0%
Others	4.7%

Source: In-Stat/MDR 5/02

Driver :

- Customer awareness and demand for entertainment.
- Widespread broadband adoption
- Technology Innovation in video compression and data transmission fields.

Market :

- Currently adult content VOD service is dominating the total VOD market with a total revenue of US\$ 460 million in 2002, representing 98% of the total market share.
- By end of 2004, family oriented VOD service user will outnumber the users of adult content service.
- By 2006, about 40% of the residential broadband subscribers will use VOD service.

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Video-on-Demand Telcos vs. Cable operators

Worldwide Telco Video Subscribers

(Units in Millions)

Year	Subscribers (Millions)
2002	0.1
2003	0.2
2004	0.5
2005	1.5
2006	5.0
2007	19.0

Source: In-Stat/MDR 3/03

Status and Trend :

- Worldwide there were over 100K subscribers to video services over telco network in 2001 and 19 million are expected by 2007. (source: InStat 3/03)
- Asia is expected to take over the leading role of US in global telco video market in 2004.

Worldwide Cable VOD Subscriber

(Subscribers in Millions)

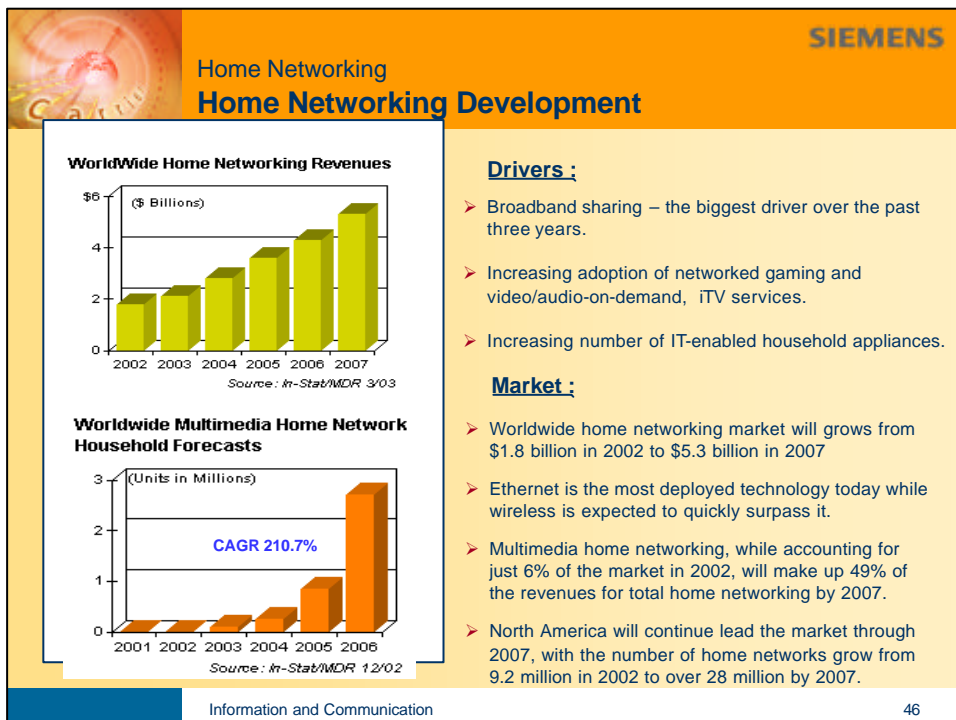
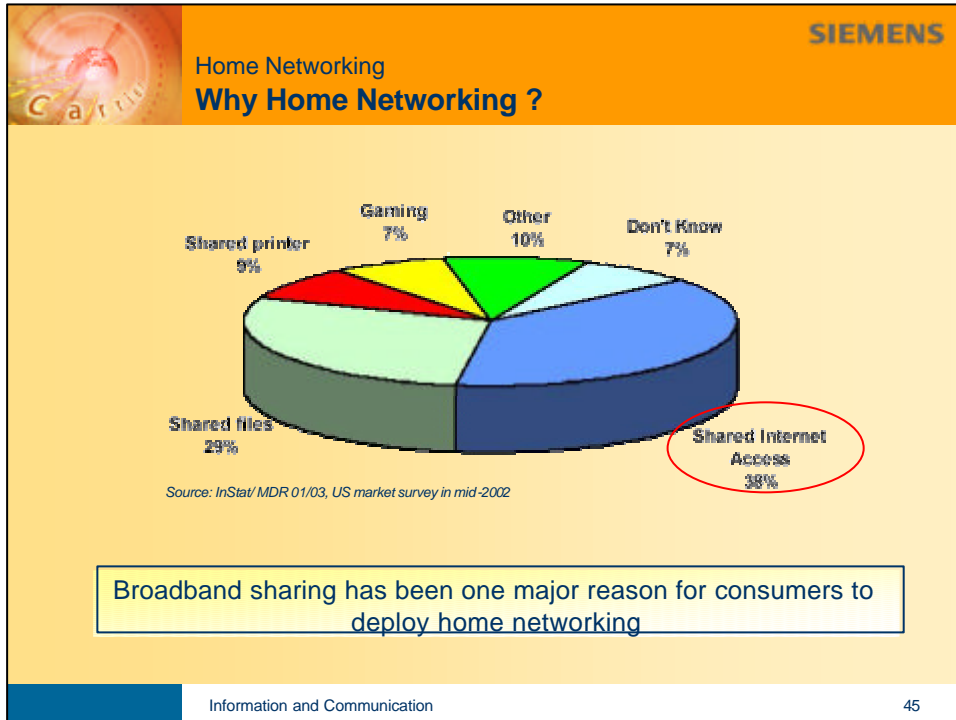
Year	Subscribers (Millions)
2001	1.0
2002	2.0
2003	3.0
2004	4.0
2005	6.0
2006	11.0

Source: In-Stat/MDR 12/02

Challenges :

- Competition from Cable TV operators, whose VOD subscriber base will increase from current 3 million to over 11 million by 2006 (source: InStat 02).
- Regulatory policy, in some regions.
- Availability of mass telco broadband access.

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Home Networking Audio and Video Entertainment The Future Driver for Home Networking

The typical home network today is data-based and PC centered, emphasizes sharing peripherals and broadband within home ...

With the popularity of online gaming digital TV, and audio / video-on-demand services, multimedia home networks are needed to share these digital content...

Networked home entertainment will become the biggest driver of home networking over next 5 years!

And online gaming console will become the biggest home networking product!

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Presentation's Roadmap

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Growing ARPU and Attractive Data Services are major Drivers for Operator Revenues

Source: ICM N M Market Assessment

- Gradually, data-oriented services will account for one third of the traffic revenues worldwide
- Mobile data revenues will grow much stronger than voice revenues

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Average Monthly Revenue per User

All kind of services are suitable to be offered simultaneously in fixed & mobile

Source: Siemens Mobile Networks Marketing, 2003
Note: Machine-to-Machine revenues are not included in this chart.

- Messaging will be main driver of ARPU growth until 2006
- Beginning with 2005 real-time multimedia communication will gain a large momentum
- Person-to-Person Communication generates 90% of revenues

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Upside Potential through Indoor-Outdoor Convergence

Increasing ARPU by

- **Attractive service packages**
 - Convenience
 - Common look & feel
 - Transparent pricing by unified charging
- **Faster uptake of new services**
 - Increasing critical mass of users
 - Especially for person-to-person services
 - Like Peer-to-peer Real time Multimedia
- **Stimulation of additional voice calls**
 - Induced by increased usage of data services

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Acceptance of Mobile Data Services

Prerequisites for Successful Mobile Data Services:

- Personalized and highly customized
- More individual bandwidth
- Always-on
- Global roaming
- Seamless network, UMTS-GPRS-GSM
- Rich multimedia services:
Information, transaction, entertainment

β

my services, anytime, anywhere, on my device

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The Future has already started: many mobile data services can be deployed today

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- 3G delivers seamless services from narrowband to broadband and will support flexible bandwidth on demand up to 2 Mbps per cell

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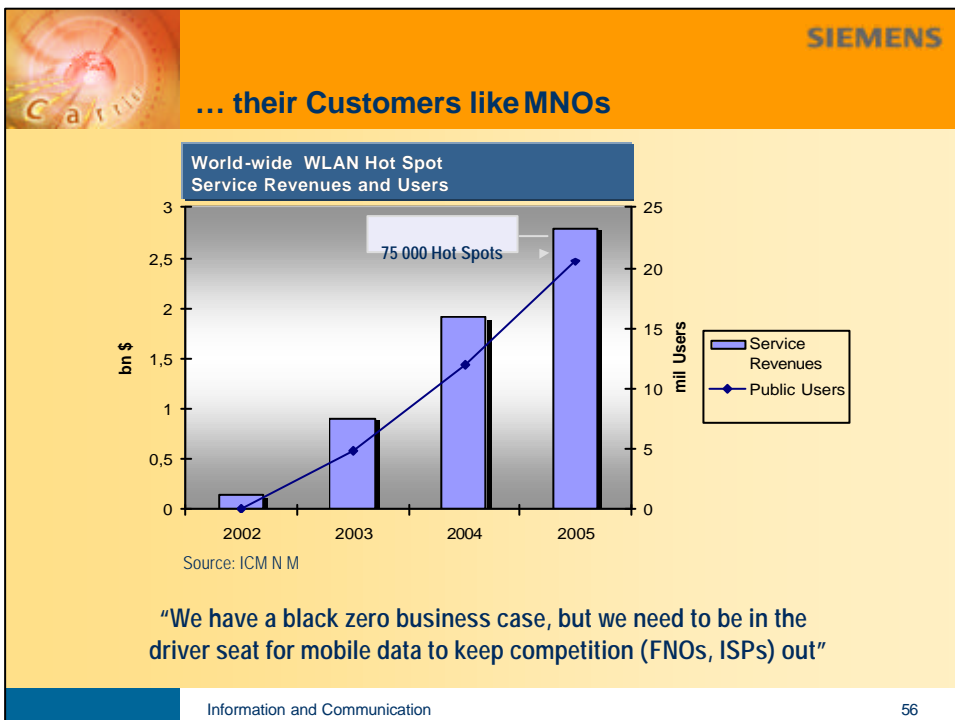
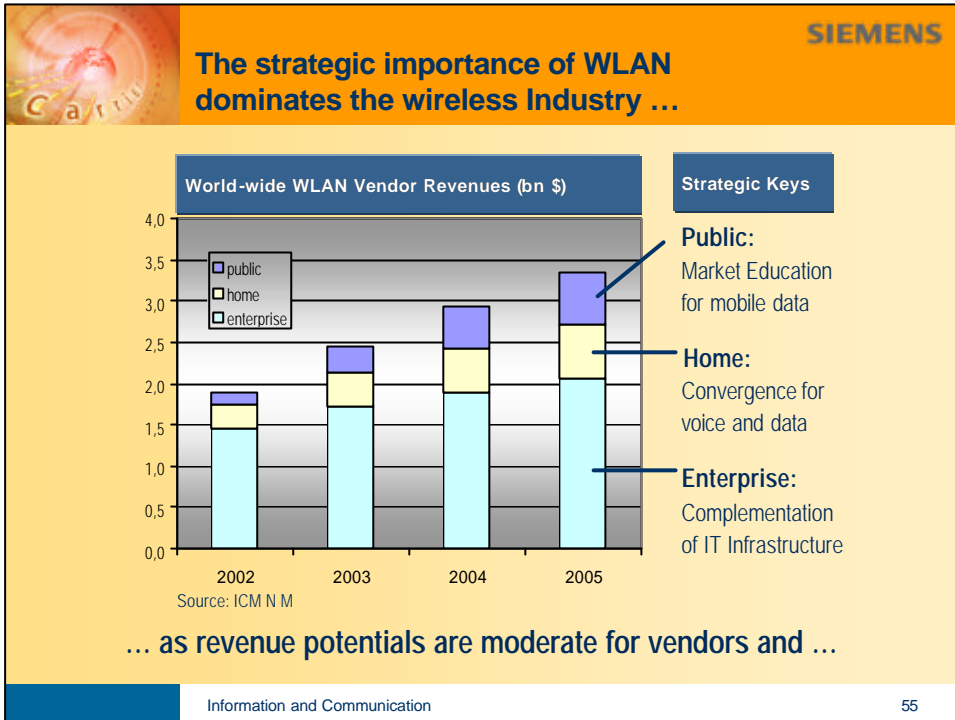
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Wireless must trade-off Throughput for Mobility & Range

- Mobile radio access networks are designed to meet certain maximum requirements for grade of mobility and range
- WLANs are designed for high data rates, low ranges and generally low mobility

Mobility & Range

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SIEMENS

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