

IMS, Peer-to-Peer and Beyond

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IKR/VFF-IND Workshop
Dienste im Next Generation Network
University of Stuttgart
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Outline

Prologue

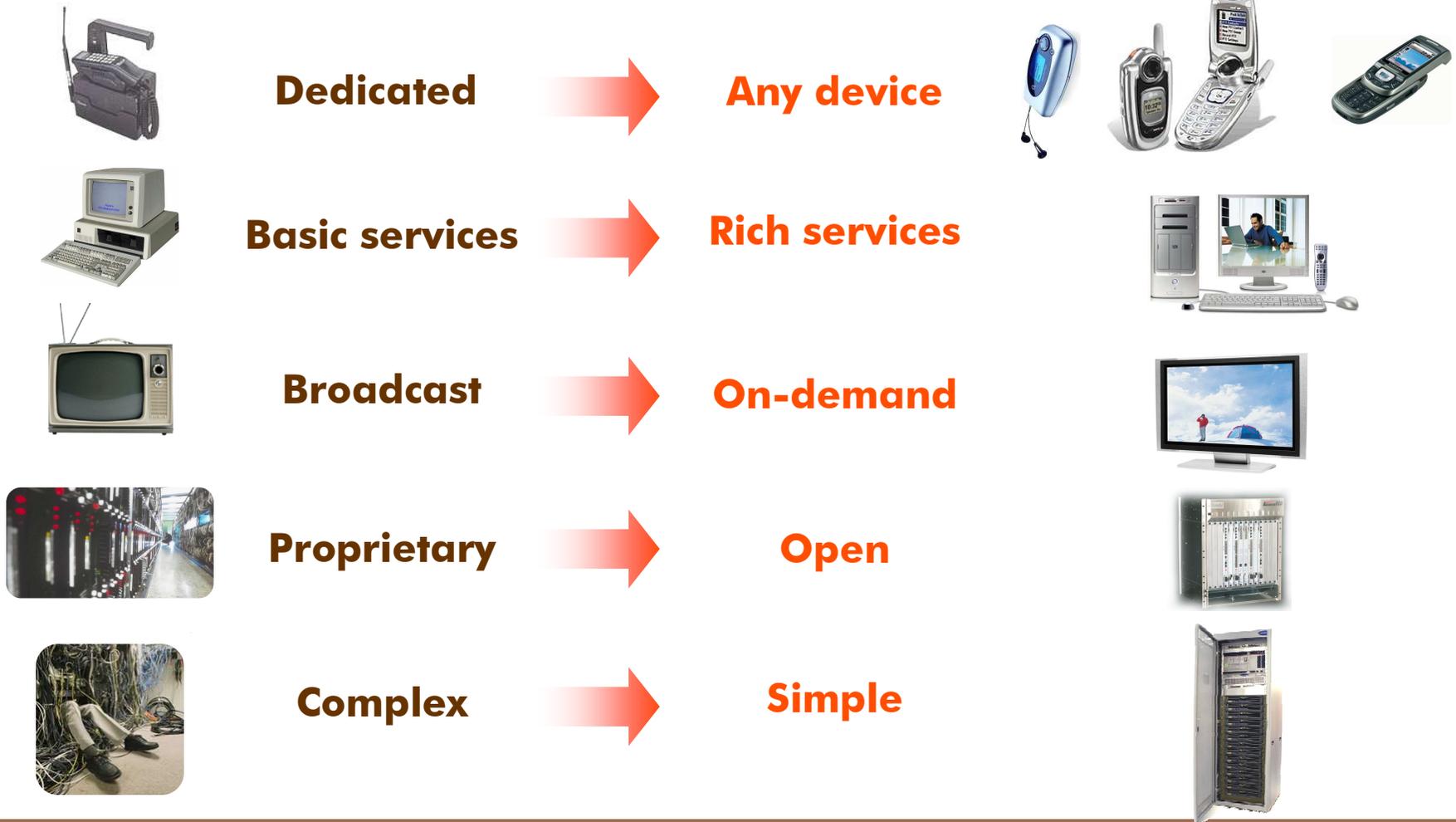
- IP – Disruption for Service Providers
- Operators' Motivation for NGN & IMS
- Peer-to-Peer Threat and Chances
- Thinking User Centric
- Beyond IMS – Service-aware Networks





IP Represents a Major Disruption

It provides flexibility, simplicity and openness



Transformation of the Telco Market

- **Service Providers radically transforming their business models**
 - ▶ IP network transformation
 - ▶ New customer interaction models
 - ▶ Changing their business DNA

- **A massive industry shift – triggering strong upturn in vendor markets**

- **Two main drivers**
 - ▶ Simplify networks / increase operational efficiency ("One Factory")
 - ▶ Be first on the market with new services





IP Revolution in a Nutshell

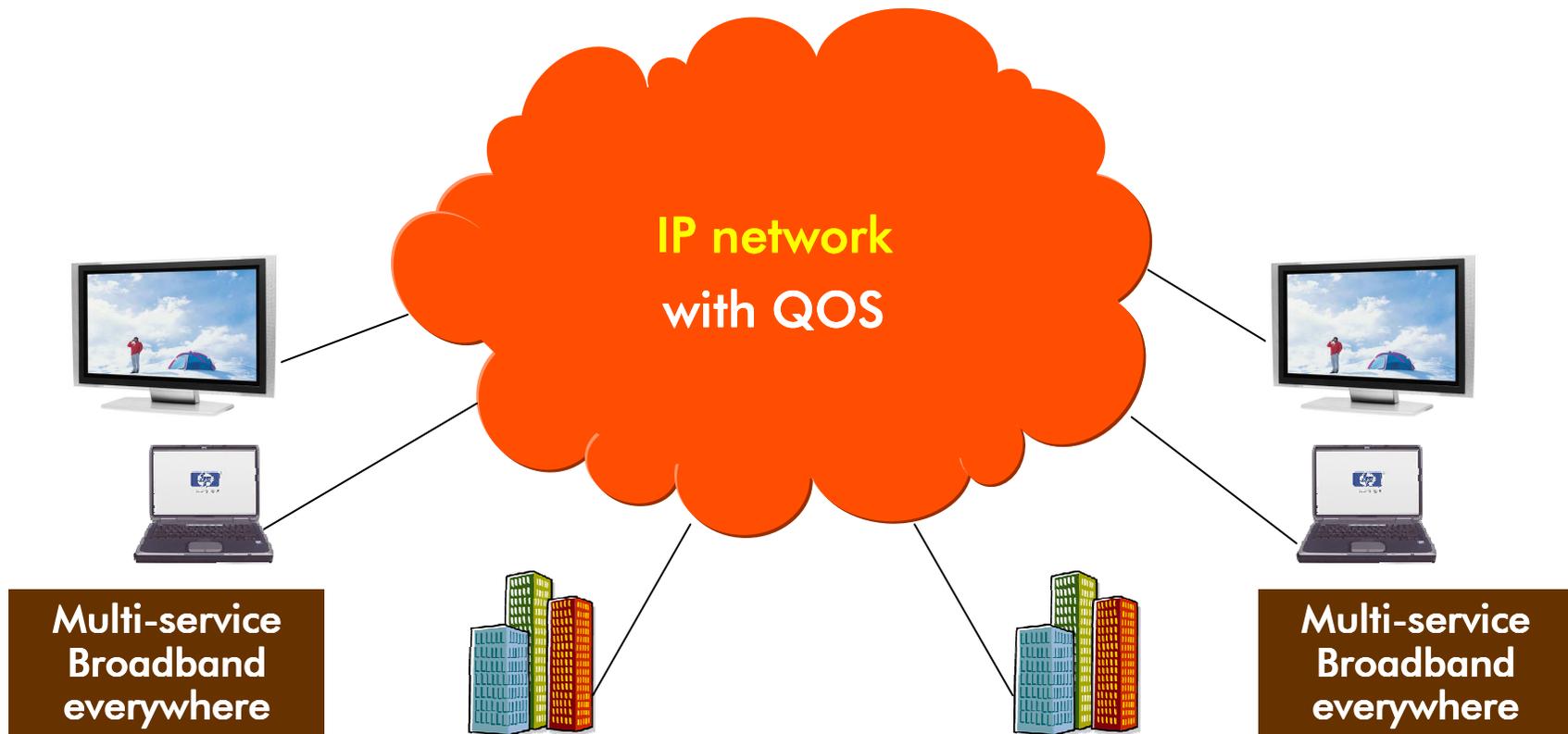
IP networks started with Internet





IP Revolution in a Nutshell

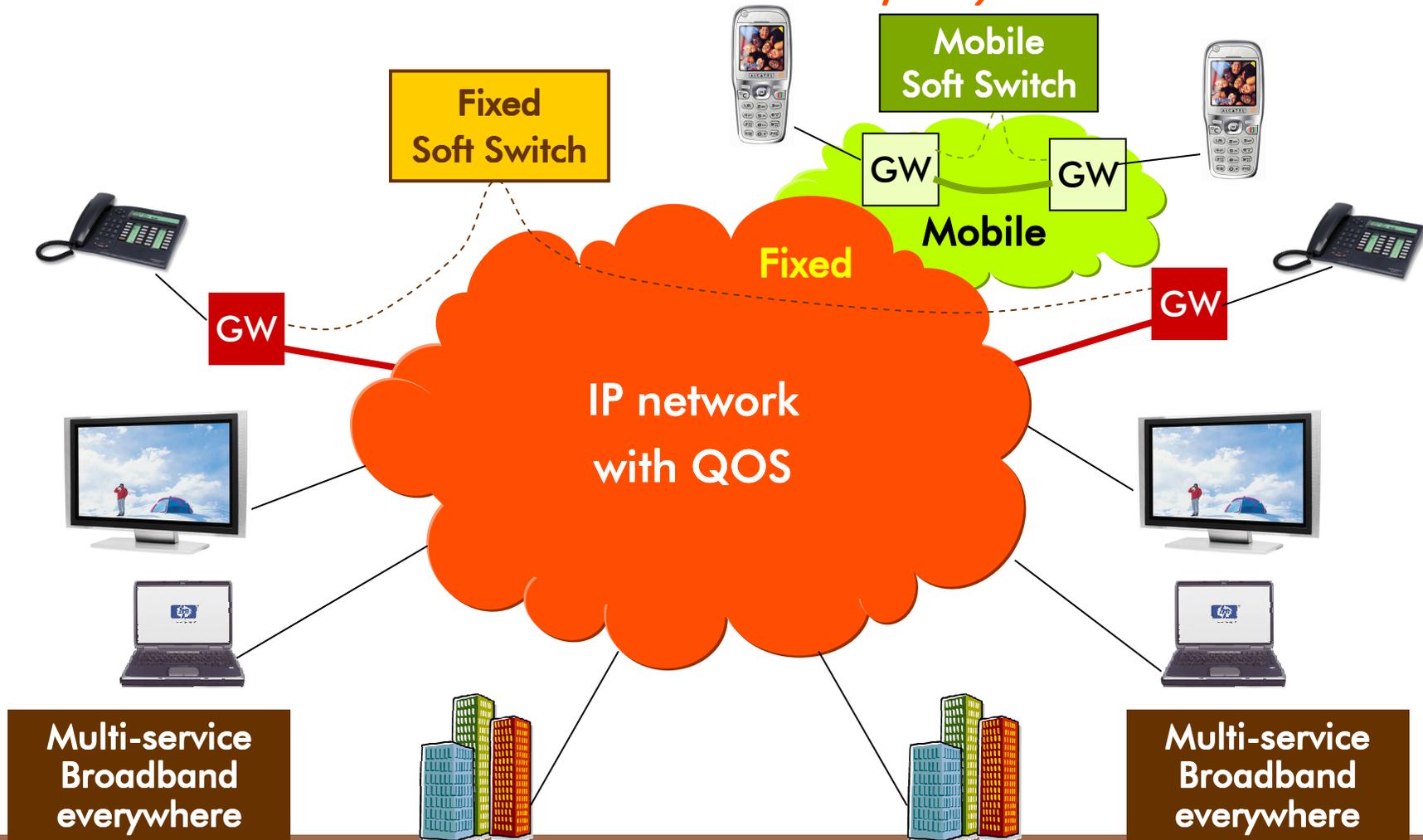
IP networks have grown with extended broadband services





IP Revolution in a Nutshell

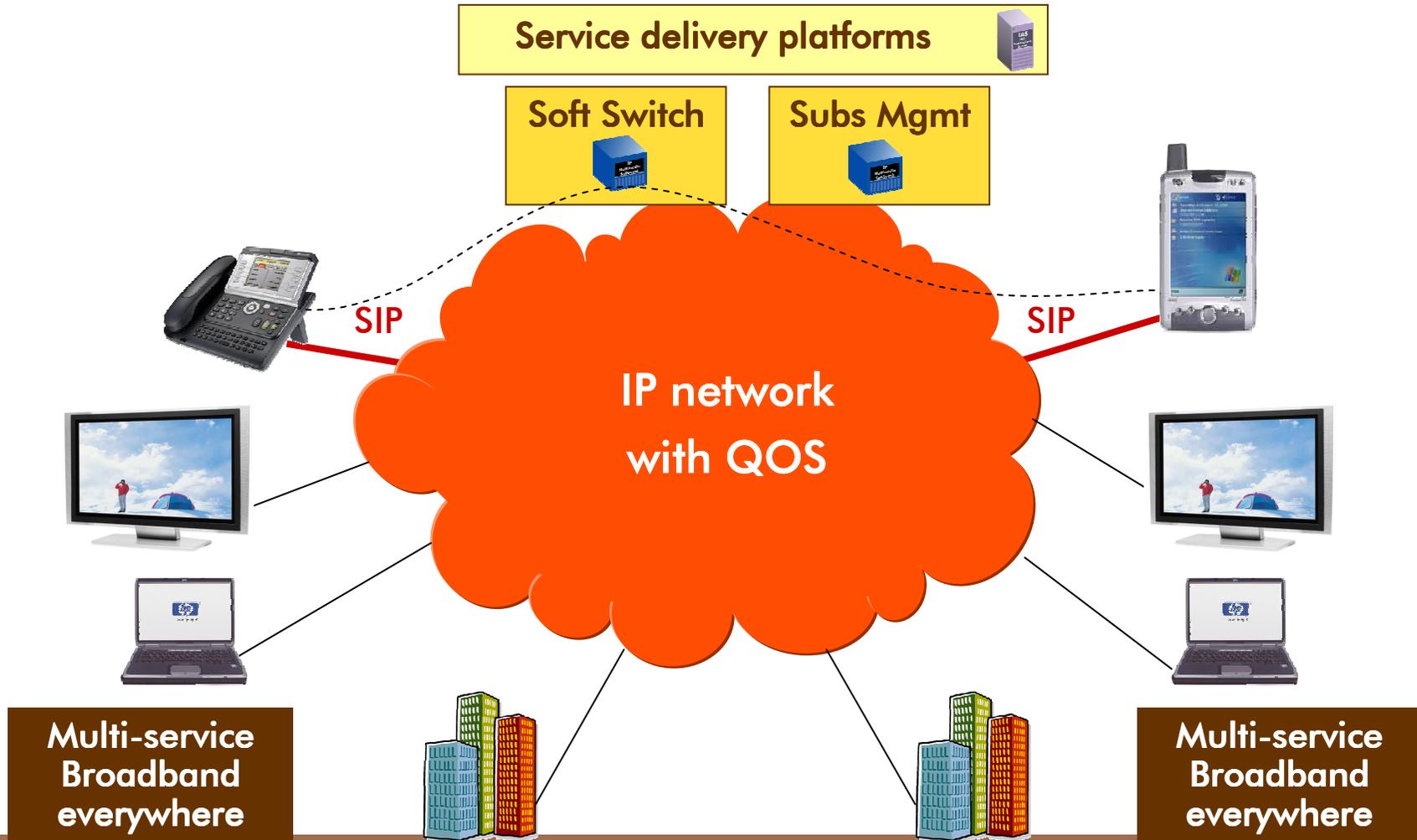
IP networks have enabled Telephony with NGN





IP Revolution in a Nutshell

Fixed and Mobile IP networks converge with IMS



IP has a Dramatic Impact on Operators

Network economics are transformed

- **Equipment costs are shrinking fast**
 - ▶ Cost per Gig declining by factor 10 with each generation: LL, ATM, IP

- **Network architectures are being collapsed**
 - ▶ From many dedicated and multi-layered networks
 - ▶ to streamlined multi-service IP network

- **Service proliferation can be accommodated**
 - ▶ SDPs to replace hundreds of service OSS-BSS silos

- **Operating costs can be dramatically reduced**
 - ▶ Centralization, simplification,...





IP has a Dramatic Impact on Operators

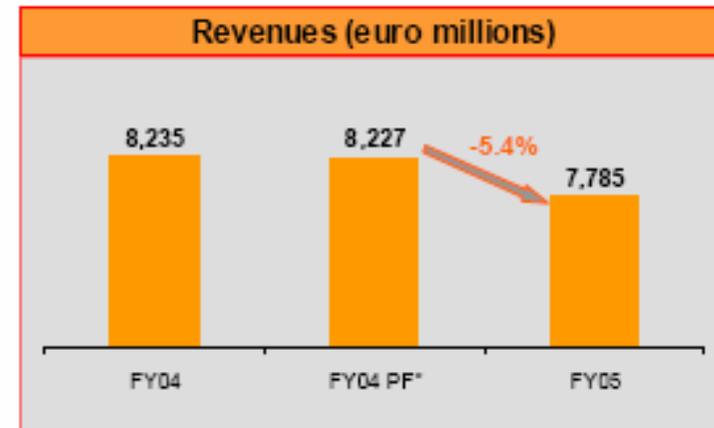
IP puts Enterprise revenues under pressure

- Price erosion of data services with conversion to IP & Broadband
- Fixed voice revenues declining due to VoIP
- Flat mobile revenues in mature markets

Typical case:



Enterprise in 2005



Incumbent Operators Challenged by IP

Market Pressures

NEW ENTRANTS	Google-type entrants 
MEDIA	Content providers' distribution channels multiplying
TECHNO	Proliferation of new technologies and evolution towards all IP
USER	Mass customization of new services
STOCK MARKETS	Investments' shorter payback and better risk control

Network Challenges

- Improve time-to-market
- Innovation
- Future-safe
- Open network
- Improve cost effectiveness





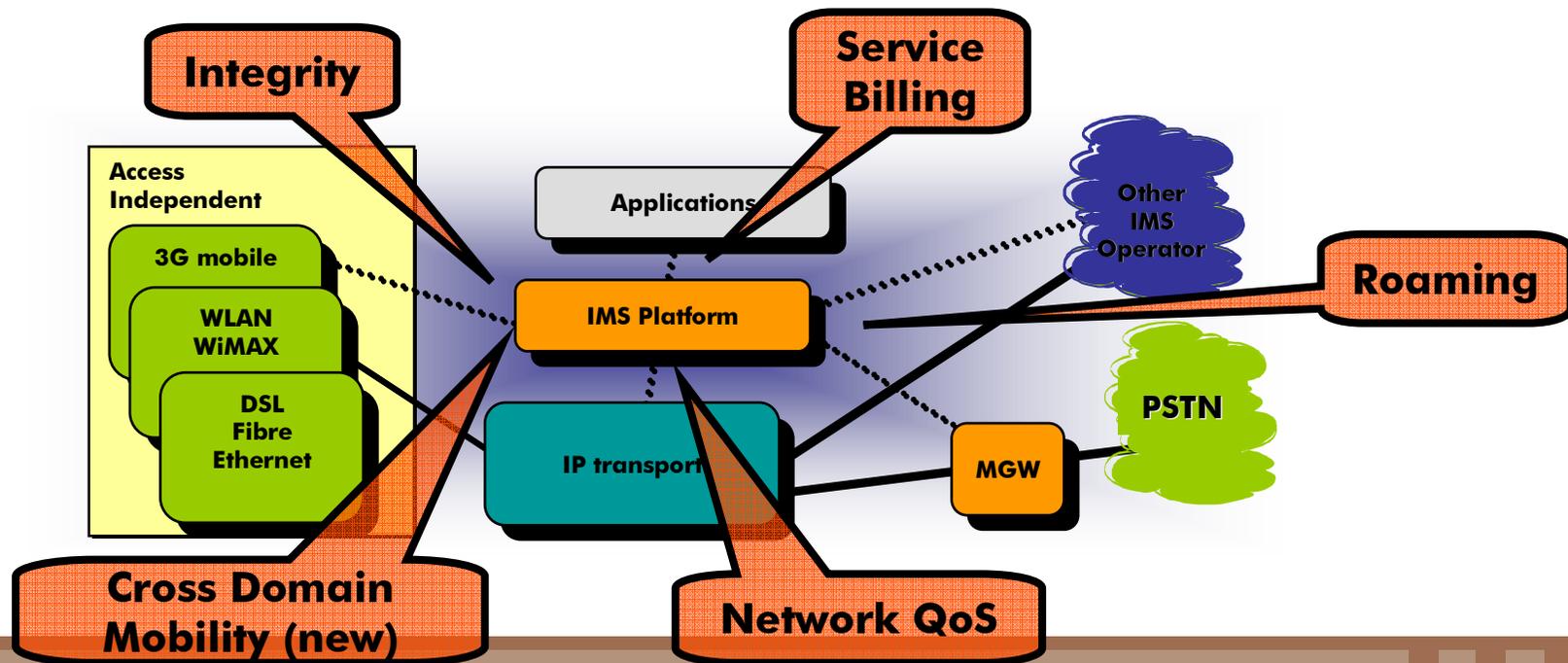
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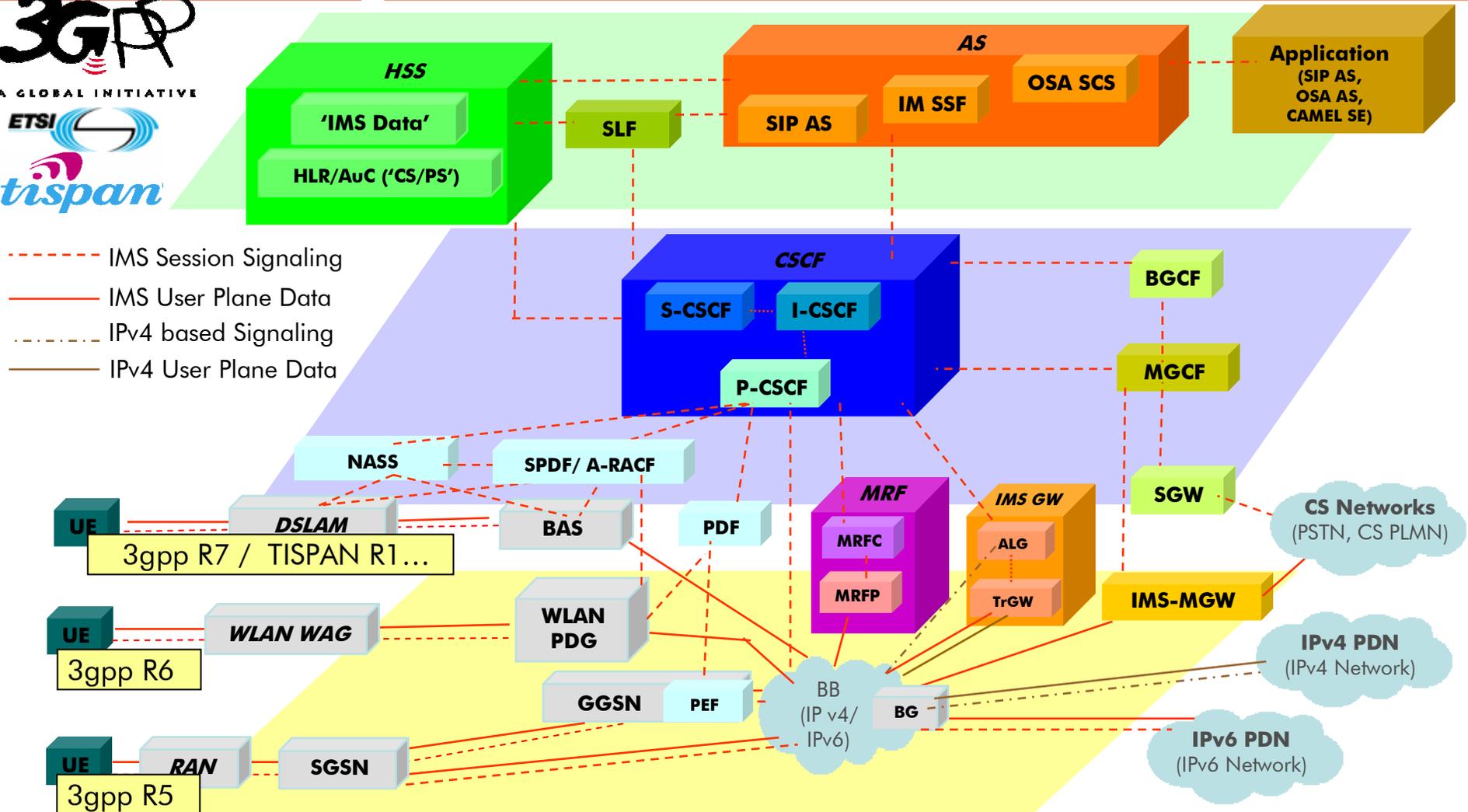


IMS Motivation

- **Standardized multimedia architecture for mobile and fixed services**
 - ▶ Heterogeneous Access Technology – Unified IP Packet Transport
 - ▶ Based on SIP, DIAMETER and MEGACO controls
 - ▶ Developed in 3GPP but now adopted by 3GPP2 / LTE, ETSI
 - ▶ Operator requirements: Roaming, Security, Quality of Service, Service Billing



IMS Standardization Overview



- - - IMS Session Signaling
- IMS User Plane Data
- ... IPv4 based Signaling
- IPv4 User Plane Data

This is only a logical (functional) architecture, not a physical one.



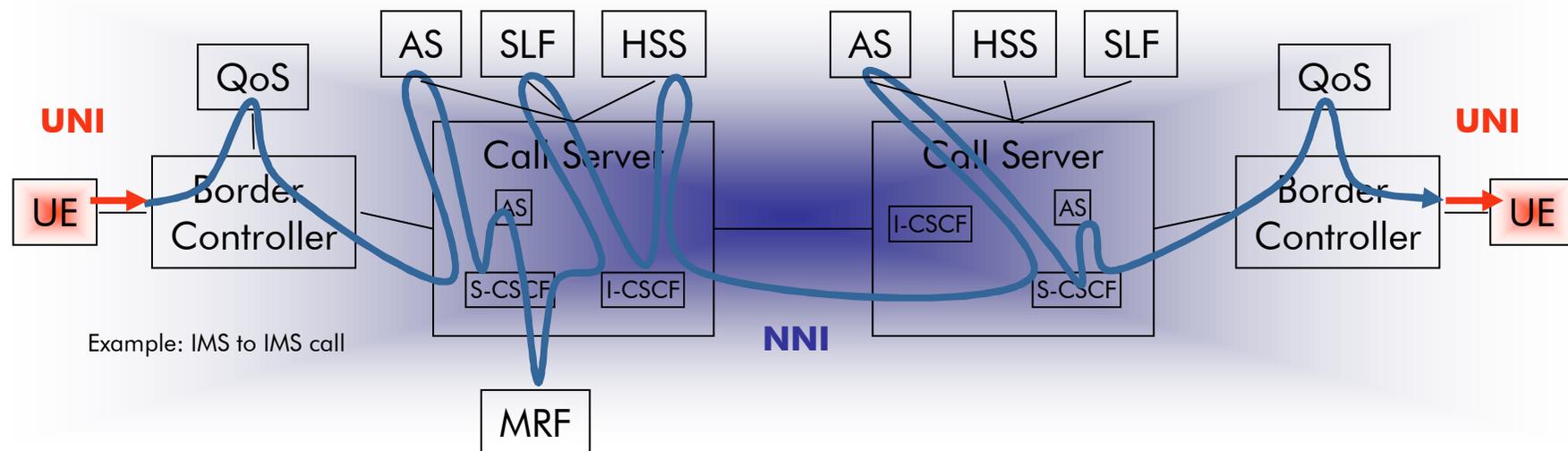
IKR/VFF-IND Workshop "Dienste im NGN"
University of Stuttgart, 03 March 2006



IMS Call Control Principle

■ SIP call flow: Simple UNI – Complex NNI

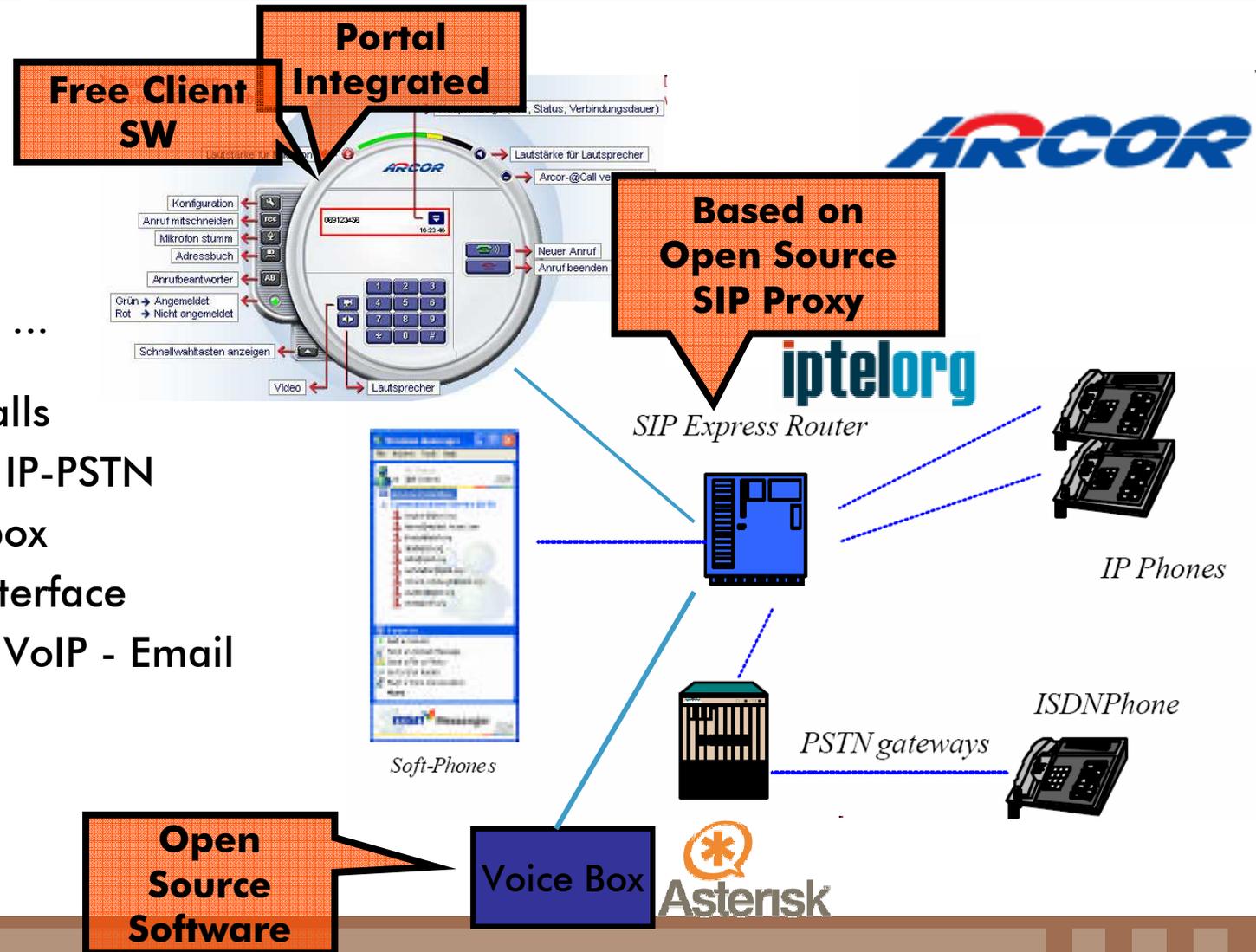
- ▶ QoS & Security Enforcement
- ▶ Application and Supplementary Services Invocation
- ▶ Discovery of Call Server
- ▶ Optional: Media Resources

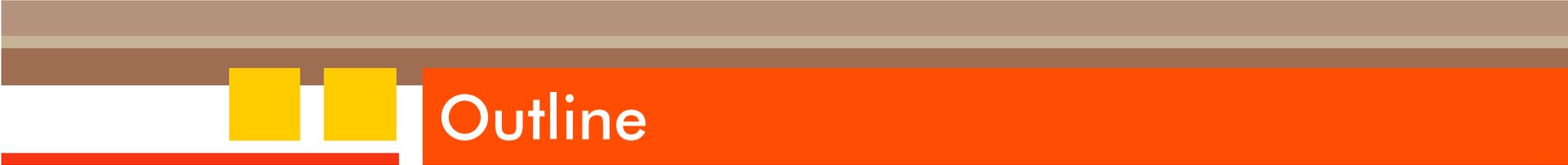


Carrier's Low Cost VoIP Playgrounds

Pre-IMS in Germany

- ▶ DT
- ▶ Arcor
- ▶ Freenet.de, ...
- ▶ free IP-IP calls
- ▶ 1..2 ct/min IP-PSTN
- ▶ free voice box
- ▶ free web interface
- ▶ integration VoIP - Email





Outline

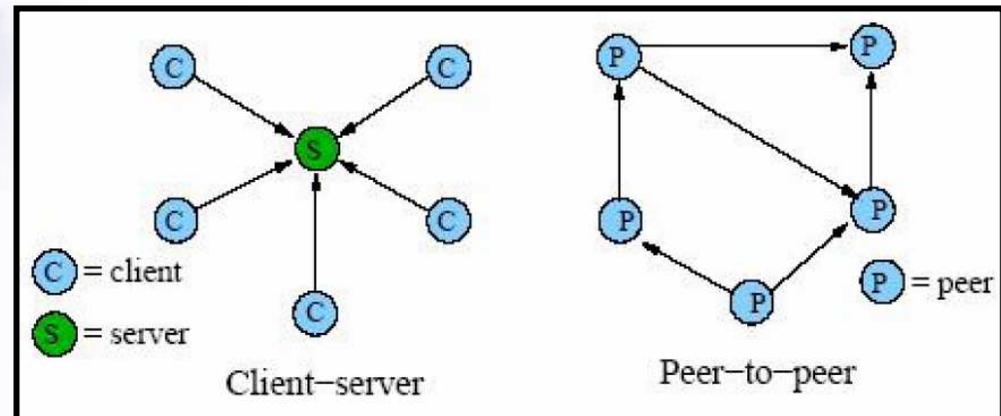
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Peer-to-Peer Threat

- In the world of "End to End Application" there is little "lock-in" for carriers except doing the job the customer wants done.
- That's the "constraint," control is now, and increasingly, in the customers hand.

» Somewhere from the blogo-sphere «



What does P2P really mean ?

- **Nothing really new ?**
 - ▶ Turn the internet to it's original version
 - ▶ Early email systems, Usenet fora, ...
- **A design philosophy stressing decentralization ?**
 - ▶ Self-organization
 - ▶ Scalability and robustness
- **An IT architecture ?**
 - ▶ Middleware for distributed systems
 - ▶ A set of protocols focusing high dynamics
- **Intelligence shifted to the end devices ?**
 - ▶ Network of equals – client and server at the same time (SERVENT)
 - ▶ Today the driver for “sexy” internet applications is at the edge
- **New business model ?**
 - ▶ Content distribution, service / user / resource discovery
 - ▶ Skype – “telcoland attacked from cyberspace”
- **Merely a fad ?**

Along a viewpoint article of D. Schoder / K. Fischbach



Skype – P2P VoIP / Video / Conferencing

- ~ 20M \$ investor funding*
- ~ 20M \$ annual revenue from PSTN interconnect*
- ~ 5M \$ R&D investment (3 years, 20...100p)*

€ Market value:
eBAY bought Skype

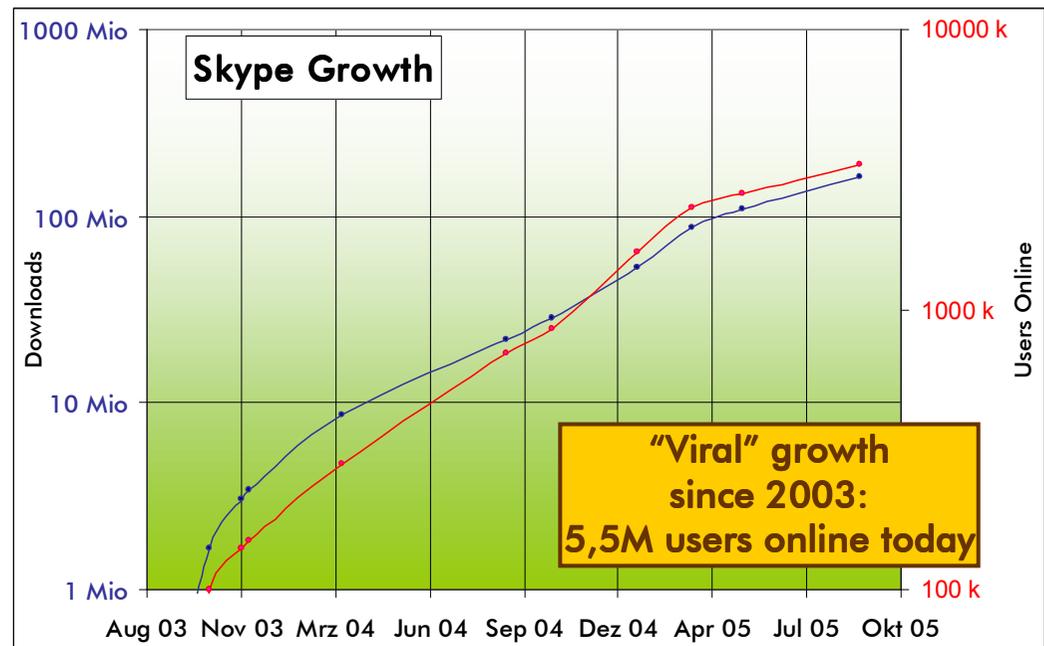
- 1,3b \$ cash
- 1,3b \$ in stocks
- up to 1,5b \$
in 2008/2009

4,1b\$

Brand name: "to skype"

Advanced technology

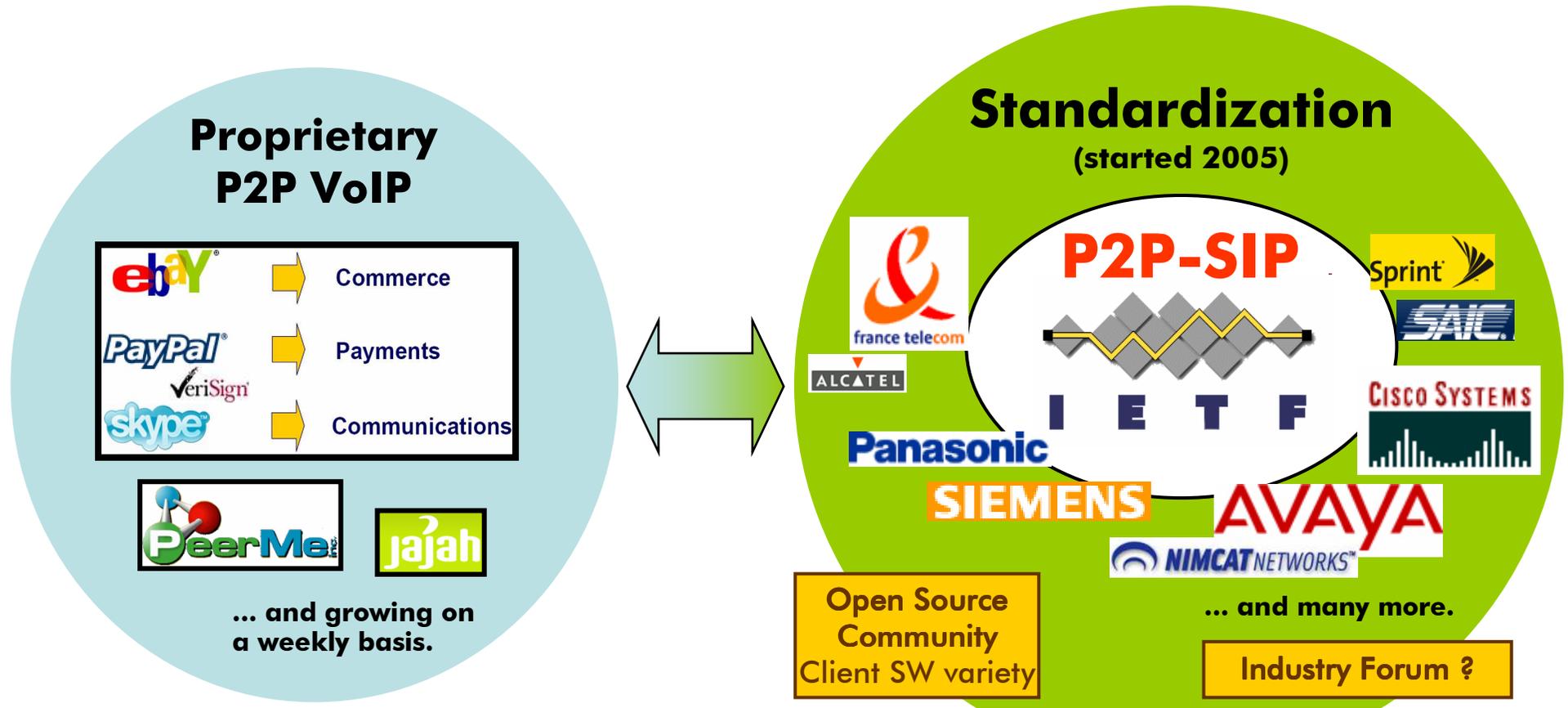
2 successful Internet entrepreneurs



* estimations



The Standardization Answer: IETF P2P-SIP



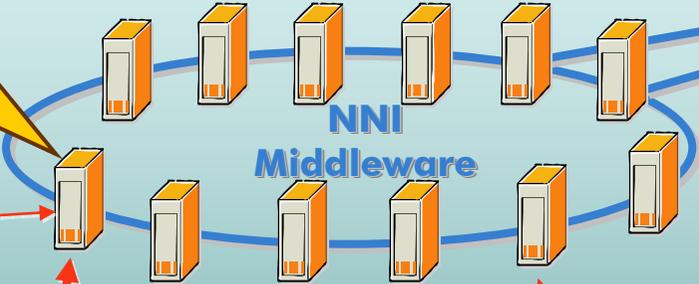
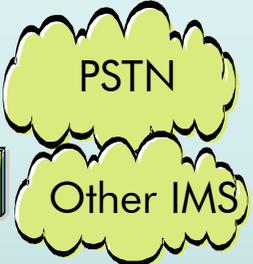
- ▶ Successful model for closed user groups (see Skype): eCommerce, buddies, B2B / B2C calls
- ▶ Open issues for public networks: security, regulation, E911/112, LI, QoS
- ▶ IETF P2P-SIP evolution has potential to become the new worldwide standard for VoIP/MMoIP



P2P IMS solution – Fat Clients

- NAT Traversal Helper
- Registrar - Authentication
- Network Presence
- Subscriber Directory
- Service Peers
 - Low perf. terminals
 - Offline users
 - Value added services

- PSTN Gateway
- Peering Gateway



- Register
- Request address of B party
- Lookup Services
- Discover NAT traversal relay

Flexible UNI

- Invoke application servers

- SIP
- HTTP/SOAP
- Personal Services
- Profile Management
- Personal Services
- Failure Reaction



- Establish call
- Keep buddy relations
- Transfer Messages



P2P-SIP – Impact on IMS

- Let's call it the Internet business model:
Basic voice is free !

Personal Ringing (Ringback) Tones Paid	Audio / Video on Demand Paid	Push To Talk Free	Voice box Free	Offnet/ PSTN interworking Paid	Operator Assisted Services Paid
Intelligent Mobile Redirect Free	Virtual Secretary (IVR/UMS) Paid	SPIT ^(voice spam) Firewall and other Security Paid	STB Telecom Dashboard Paid	Enhanced Presence Free	Enhanced Supplem. Services Paid

Bundles!

Very dynamic creation of new bundles

P2P offers call control and HSS at lowest cost

Competition erodes revenues

Free	P2P conversational service, presence, IM, some supplementary services, ... (largely terminal based)
Paid	Broadband Internet Access





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The German Case: More for Less

- Limited media budget per household
- Germany: strong consumer reticence
 - ▶ Embrace cheap communications (Skype, etc.)
 - ▶ Rather interested in cheap mobile minutes than new services
- Germany: relatively low Broadband penetration (21%)
- Germany: excellent free-TV
 - ▶ No "simple" standard Triple Play approach feasible

The race to the bottom is on!

Need to offer added value!



Convergence from a User's Perspective



■ Convergence ?

- ▶ Different network types
 - ▶ fixed / mobile
 - ▶ public / private
- ▶ Different services
 - ▶ same service on different terminals
 - ▶ different services on same terminal
 - ▶ growth beyond voice
- ▶ Different operators
 - ▶ TelCos
 - ▶ Internet companies

Internet's Way of Business

Internet Companies – Leading Global Communication Hubs

Internet Sites	Search Engines	Email Providers	IM Services	VoIP Services	Payments
<p>MSN Unique Visitors ⁽²⁾ (420MM) </p> <p>Google ⁽¹⁾ (384MM) </p> <p>Yahoo! Unique Visitors ⁽²⁾ (379MM) </p> <p>eBay ⁽¹⁾ (187MM) </p> <p>Amazon.com Active Customers ⁽²⁾ (50MM)</p> <p>AOL  Subscribers ⁽²⁾ (30MM)</p> <p>MySpace.com ⁽¹⁾ (21MM)</p>	<p>Google Search ⁽¹⁾ (218MM) </p> <p>Yahoo! Search ⁽¹⁾ (207MM) </p>	<p>Yahoo! Mail ⁽¹⁾ (219MM) </p> <p>MSN Hotmail Active Accounts ⁽²⁾ (205MM) </p> <p>Google GMail ⁽¹⁾ (27MM) </p>	<p>MSN Messenger Active Accounts ⁽²⁾ (175MM) </p> <p>Yahoo! Messenger ⁽¹⁾ (79MM) </p> <p>AOL Instant Messenger (AIM) ^(1, 3) (64MM) </p> <p>ICQ ⁽¹⁾ (31MM)</p>	<p>Skype / eBay Registered Users ⁽²⁾ (54MM)  </p>	<p>PayPal / eBay Accounts ⁽²⁾ (79MM)  </p>

Number of Users

Infrastructure Investment

(US\$ in Millions)	C2003	C2004	C2005E
Google	\$177	\$319	\$700
Y/Y	375%	80%	104%
Yahoo!	\$117	\$246	\$405
Y/Y	128%	109%	65%
eBay ⁽¹⁾	\$365	\$293	\$396
Y/Y	163%	(20%)	35%
Amazon.com	\$46	\$89	\$172
Y/Y	17%	94%	93%

Source: Company filings, Morgan Stanley Research. Figures exclude capital expenditures from acquired companies.
 (1) C2003 includes \$125.1MM purchase of additional office space.
 E = Morgan Stanley Research estimates.



Skype – Ebay Integration in China

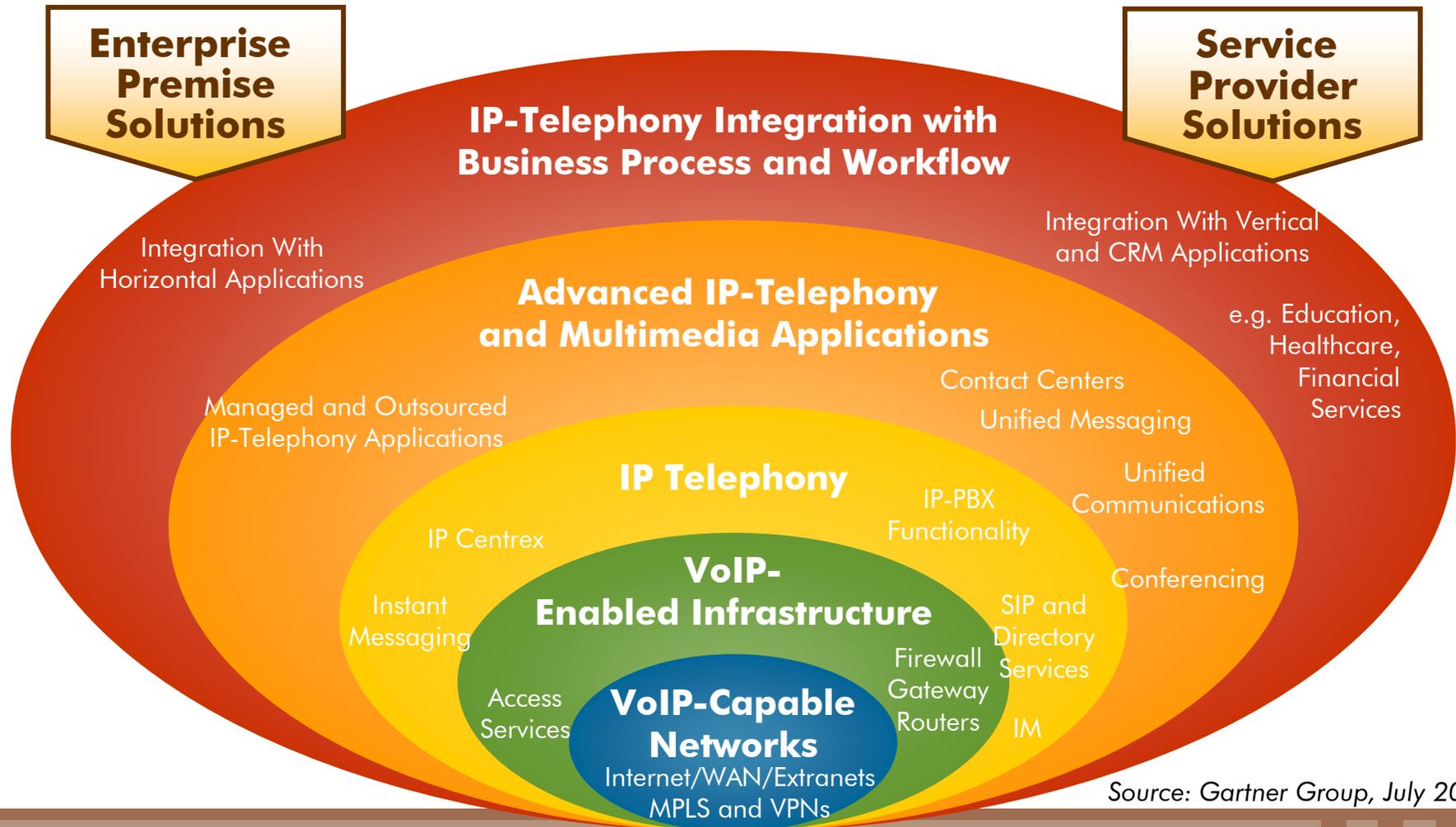


Value shift from call routing towards

- creating and keeping large customers communities
- seamless communication integration



From "Plain Vanilla VoIP" to "Rich Voice"



Source: Gartner Group, July 2003



From 3-Play to Community Services

Audience per title

Number of Titles



Films

Sport

Soaps

Reality TV

Local TV

Community content

Pictures & videos (friends & family)

Time shifting & VOD for TV consumption



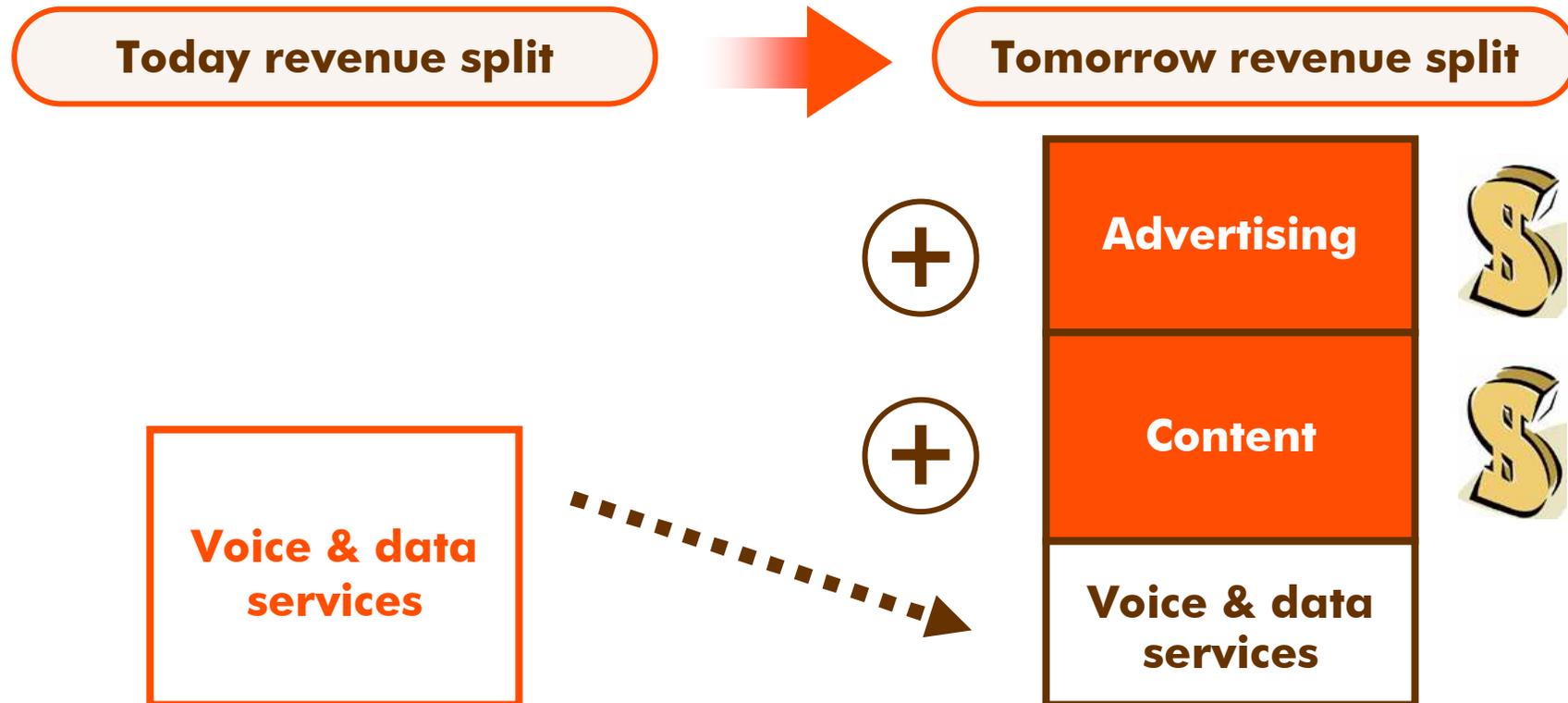
Development of personal & communities content





Change in Business Model

*Telco Operators assets :
interactivity & personalization*



Achieving IMS: IP Architecture + Broadband

Maps with A-GPS Location Tracking

Presence

Dial	Video	Org Unit	Line Type	Status
		Barcelona	111 11	
		Amsterdam	112 12	be dialed...
		Barcelona	112 13	
		Amsterdam	114 14	looking videostream...
		Barcelona	115 15	
		Barcelona	116 16	
		Amsterdam	117 17	

Real-time video monitoring



Messaging

Enter your message:

Send Message Dial Contact

Message history

14:00:20 Amsterdam - 115 - 15 --> I need more fuel

14:00:20 Barcelona - 111 - 11 --> The few minutes later

14:00:20 Barcelona - 111 - 11 --> The other bus will wait for you

14:00:20 Barcelona - 113 - 13 --> Thanks for your help

14:00:22 Barcelona - 111 - 11 --> best.

Status

14:00:20 Contact list initializing...

14:00:20 Contact list initialized

14:00:20 Status window initializing...

14:00:20 Status window initialized

14:00:20 Application started



- Video push
- A-GPS
- Messaging
- Voice

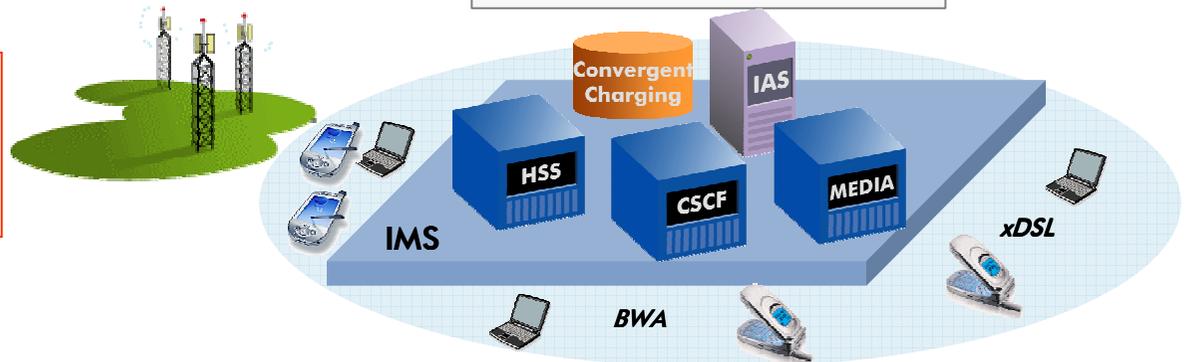
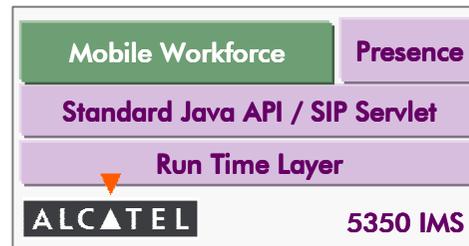
WORK FORCE

Voice Calls



**WORK FORCE
MANAGER**

ICT SOLUTIONS B.V.





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Telecom Providers under Pressure

New players, new deals: it's time for operators to react !

on fixed segment ...
... and soon on mobile market



MVNOs arrival ...

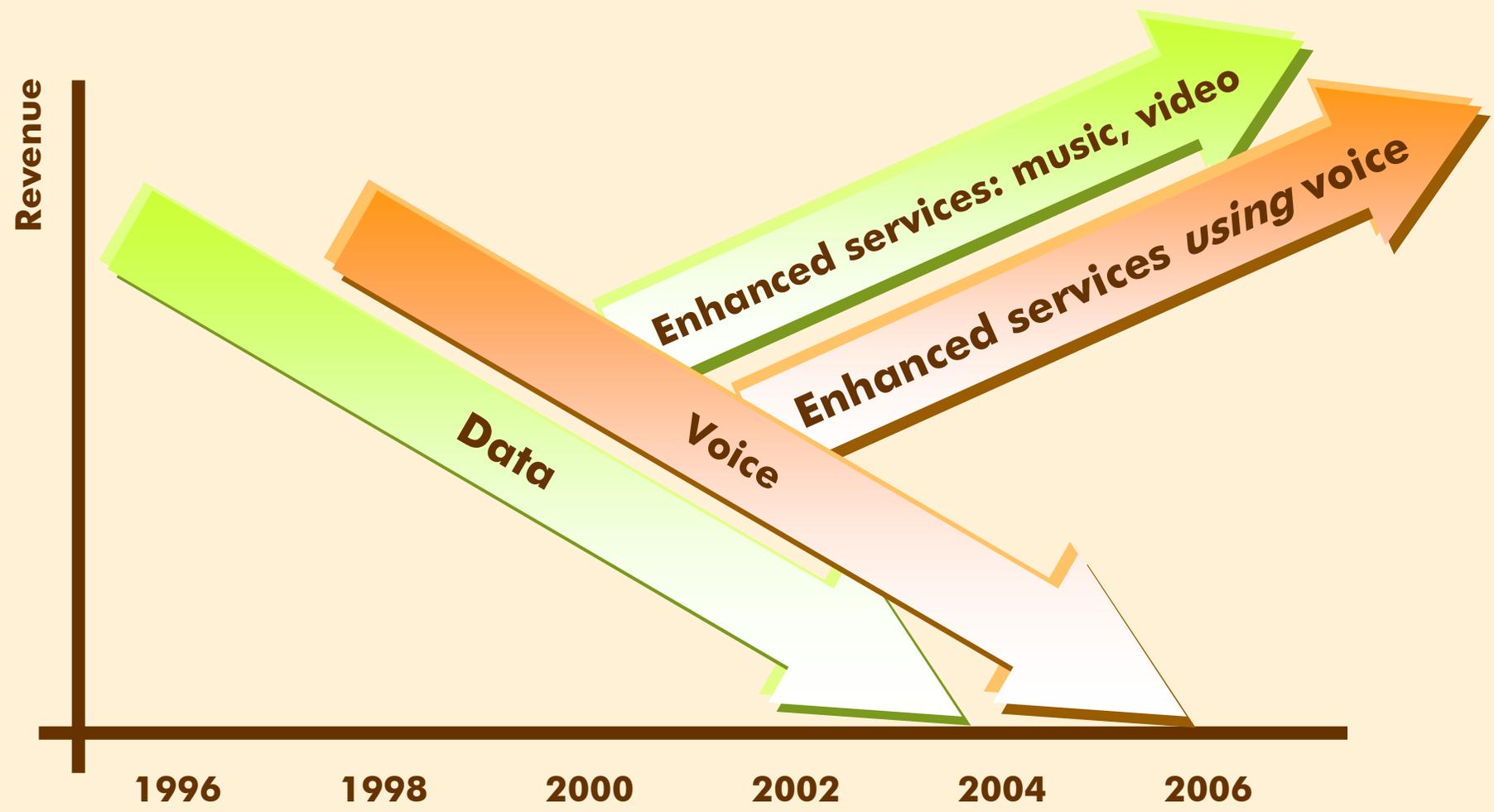


**TELECOM
SERVICE PROVIDERS**



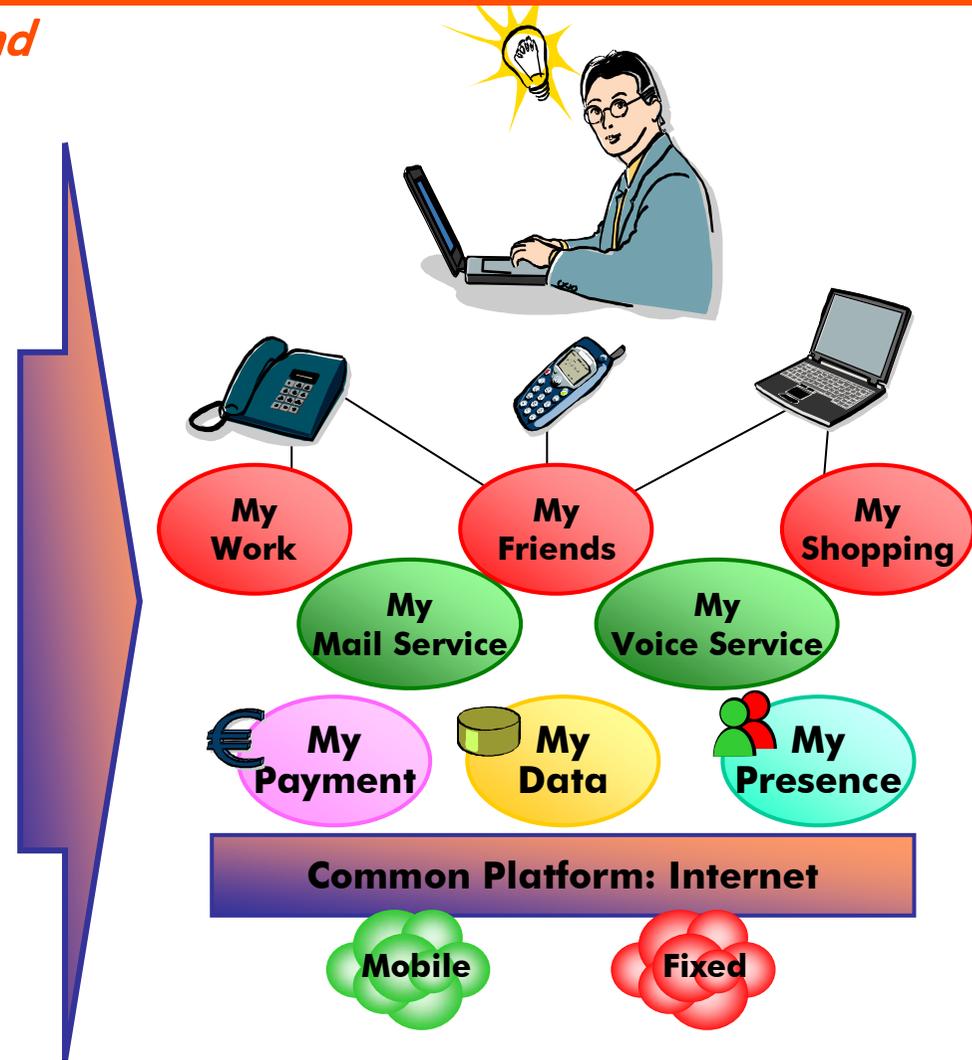
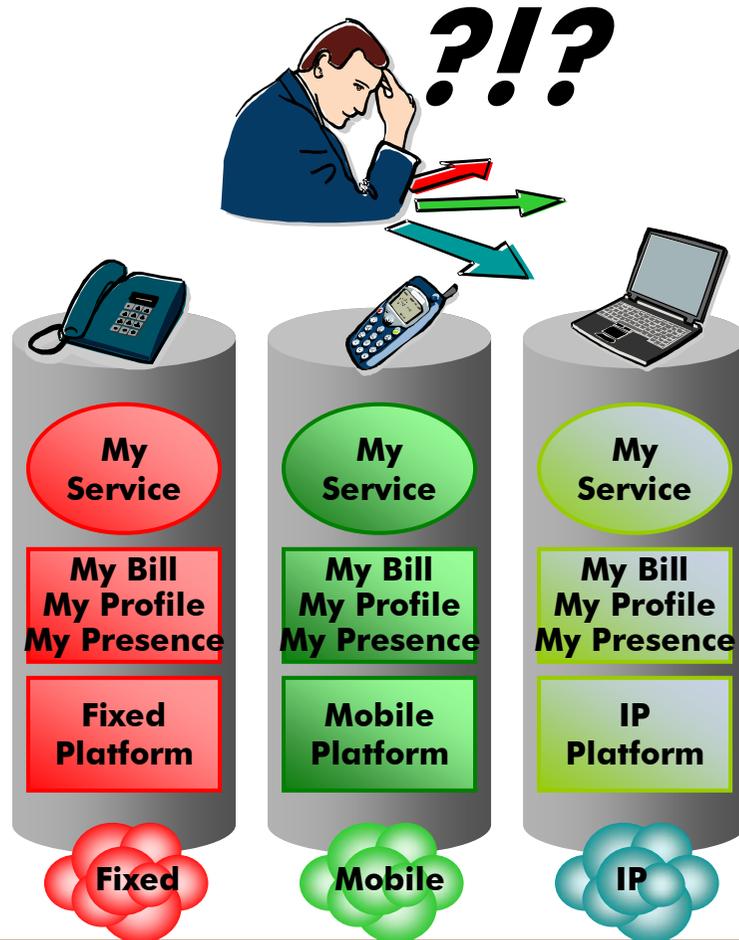


From Voice Service to Voice Component



Orchestrating User-Centric Services

*The long way to User-Centric Broadband
... a lot of work to be done*



Challenges in Communications

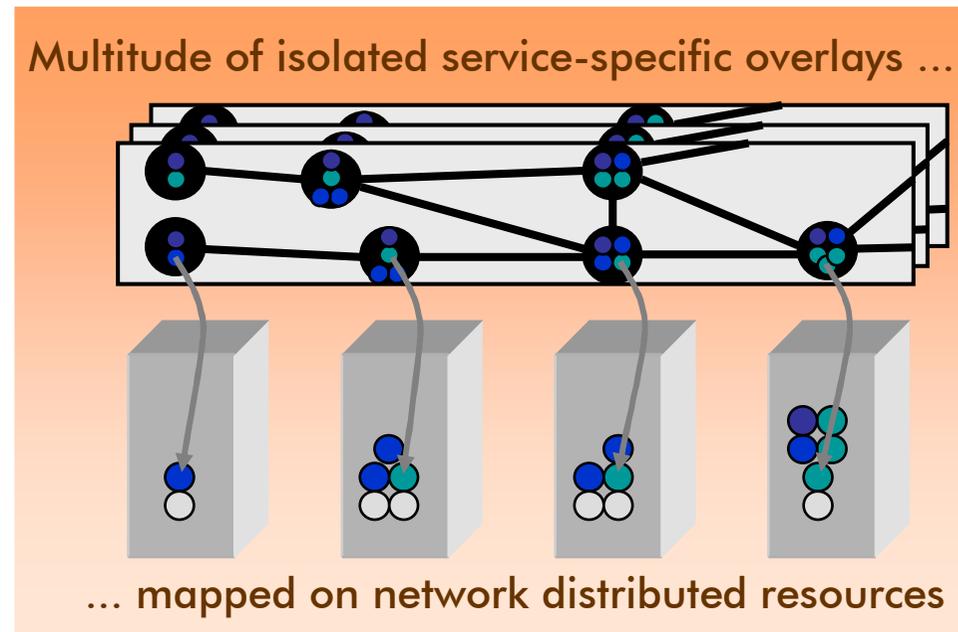
- **New methods to provide multiple new services economically**
 - ▶ Framework of components: increased efficiency by synthesizing new services through reuse of existing (distributed) basic components
 - implementing only few new components and reuse the majority available components
 - ▶ Provisioning a multitude of short-lived new services on demand requires autonomic behavior of the network infrastructure
 - service requirements to be mapped on available resources (middleware technology)
 - dynamic self-organization

- **Shift of business models in communications**
 - ▶ Value of the terminal increasing → peer-to-peer technologies
 - new capabilities of end user devices
 - multi-functional intelligent devices as user gadgets
 - ▶ Federation of data base, search and communication realms
 - lightweight communication technology embedded into global knowledge base



■ Multimedia Services Grid

- application of grid middleware technology - not related to L2/L3 grids
- maturing of great research results on distributed computing
- ▶ Networked Media and Application Server Infrastructure
- ▶ Flexible deployment of carrier services beyond IMS
- ▶ Value creation by combined services





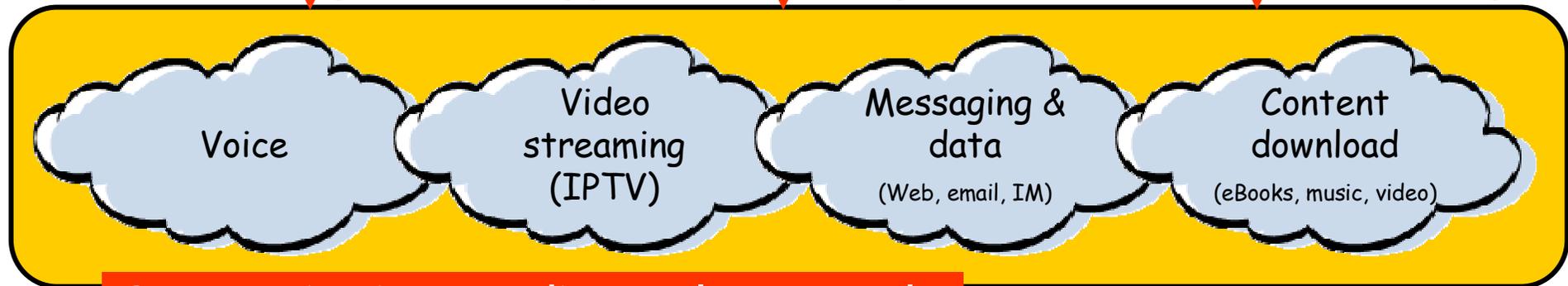
Value Add in a User-Centric World



Application overlay networks



Seamless integration of application overlays with communication overlays



Communications media overlay networks



www.alcatel.com



◀ BROADEN YOUR LIFE ▶

