

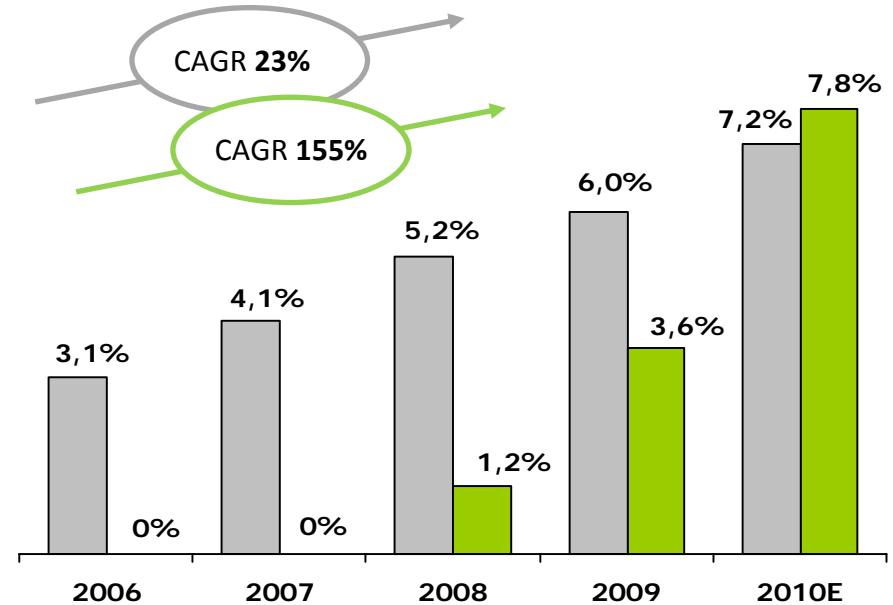
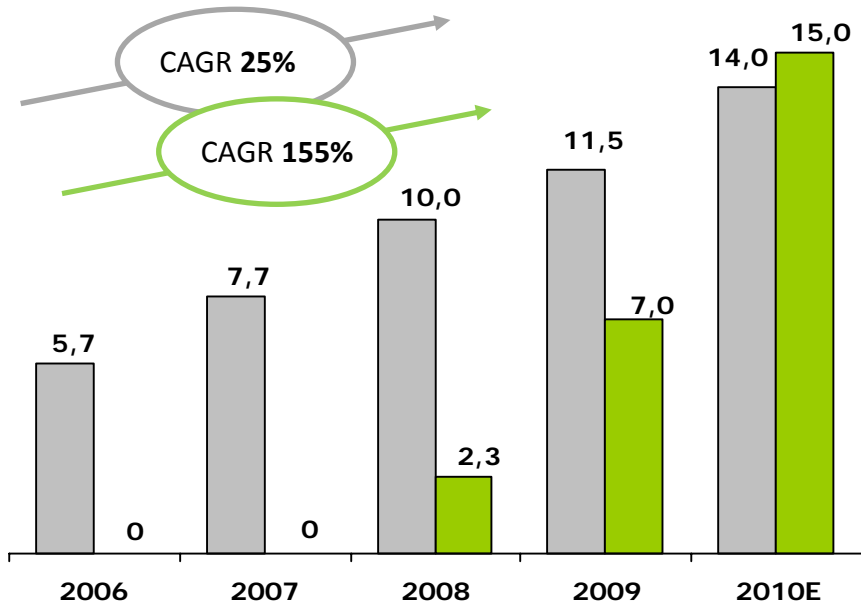
Operator Strategies for Mobile Broadband

Márcio Nunes - Diretor de Engenharia



Number of subscribers (in millions)

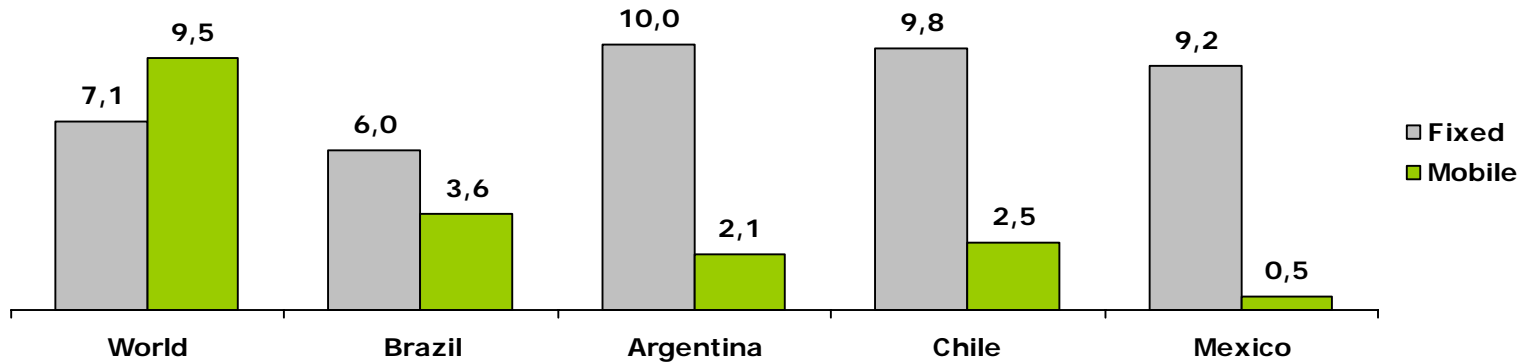
Broadband penetration



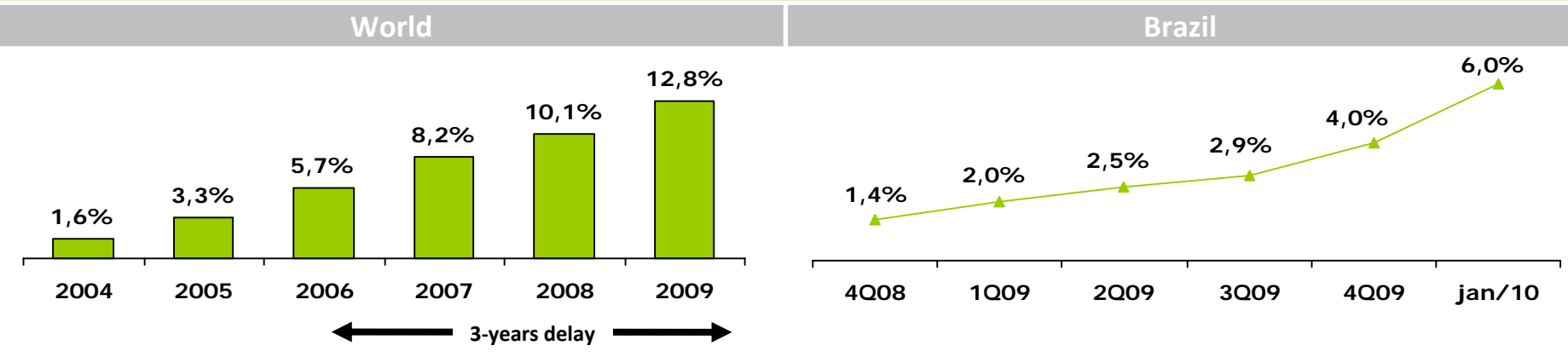
■ Fixed Broadband ■ Mobile Broadband

Mobile Broadband is likely to overtake Fixed Broadband in 2010

Broadband Penetration in 2009



Mobile Broadband Participation in Cell Phones Base



Mobile Broadband in Brazil has room to grow

Trends - Device sophistication

Web

- Web Browsing
- Web search
- Publishing and Sharing



S-XGen ultramobile comp

520MHz processor running Windows CE 5.0. Microsoft Office Mobile, 256MB of RAM, 20GB hard drive, Wi-Fi, Bluetooth and tri-band GSM/EDGE/CDMA EV-DO network access, Ethernet and USB ports, LCD touch screen, Web video camera, and a fold-out QWERTY keyboard.

Samsung SGH-V820L



Digital TV, GSM/HSDPA, 28 MB memory, 2Mpixels camera, Wi-Fi

1GB memory, Wi-Fi, HSDPA, 2M pixels camera



BlackBerry Bold

Entertainment

- Gaming
- Audio
- Video

3,5 inches Widescreen, Touchscreen, 32 GB, Wi-Fi web browsing,



iPod Touch

Media player, 480x272 pixel widescreen, 1,8GB, WiFi capabilities



Sony Playstation Portable

Windows Mobile 6, 800 MHz, 1GB RAM memory, 40GB HD, Wi-Fi, Bluetooth, 3G (HSDPA), Webcam, Biometric reader, Touch Screen



HTC Shift

Bluetooth, 7.1 Dolby Surround Sound, USB 2.0, Blu-Ray, 80 GB, 1.080p



Sony Playstation 3

GSM/HSDPA, 160 MB memory, GPS, 5Mpixels camera, Wi-Fi, Mp3 player



Nokia N95

UMTS, HSDPA, Wi-Fi, EDGE, GPS, Bluetooth, Music, Push Mail, Calendar



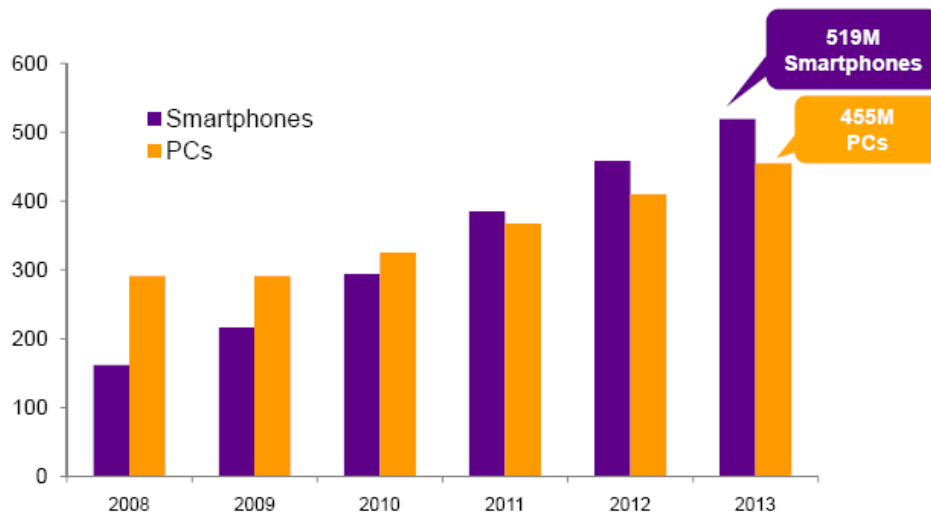
iPhone

Communication

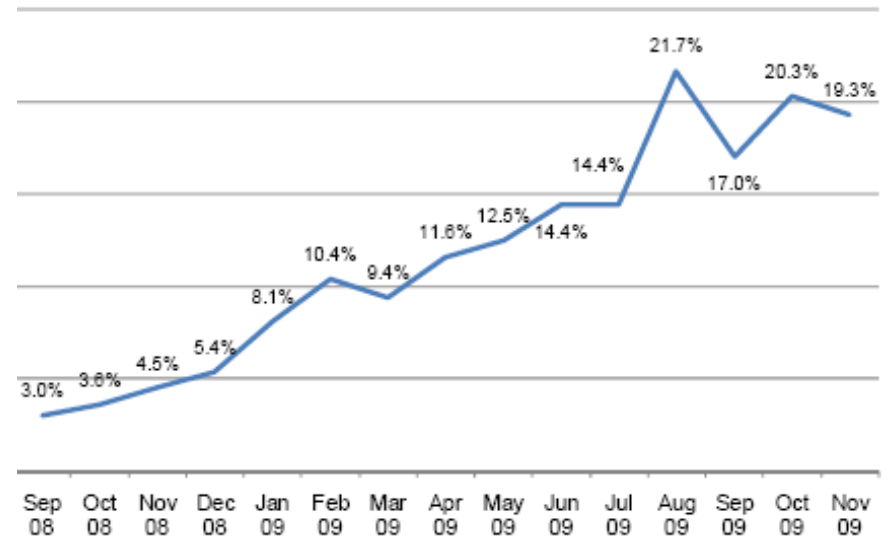
- Voice
- Video
- Messaging

The device we formerly knew as the cell phone is evolving into an Internet-enabled consumer device

Global Devices Sales (in millions)

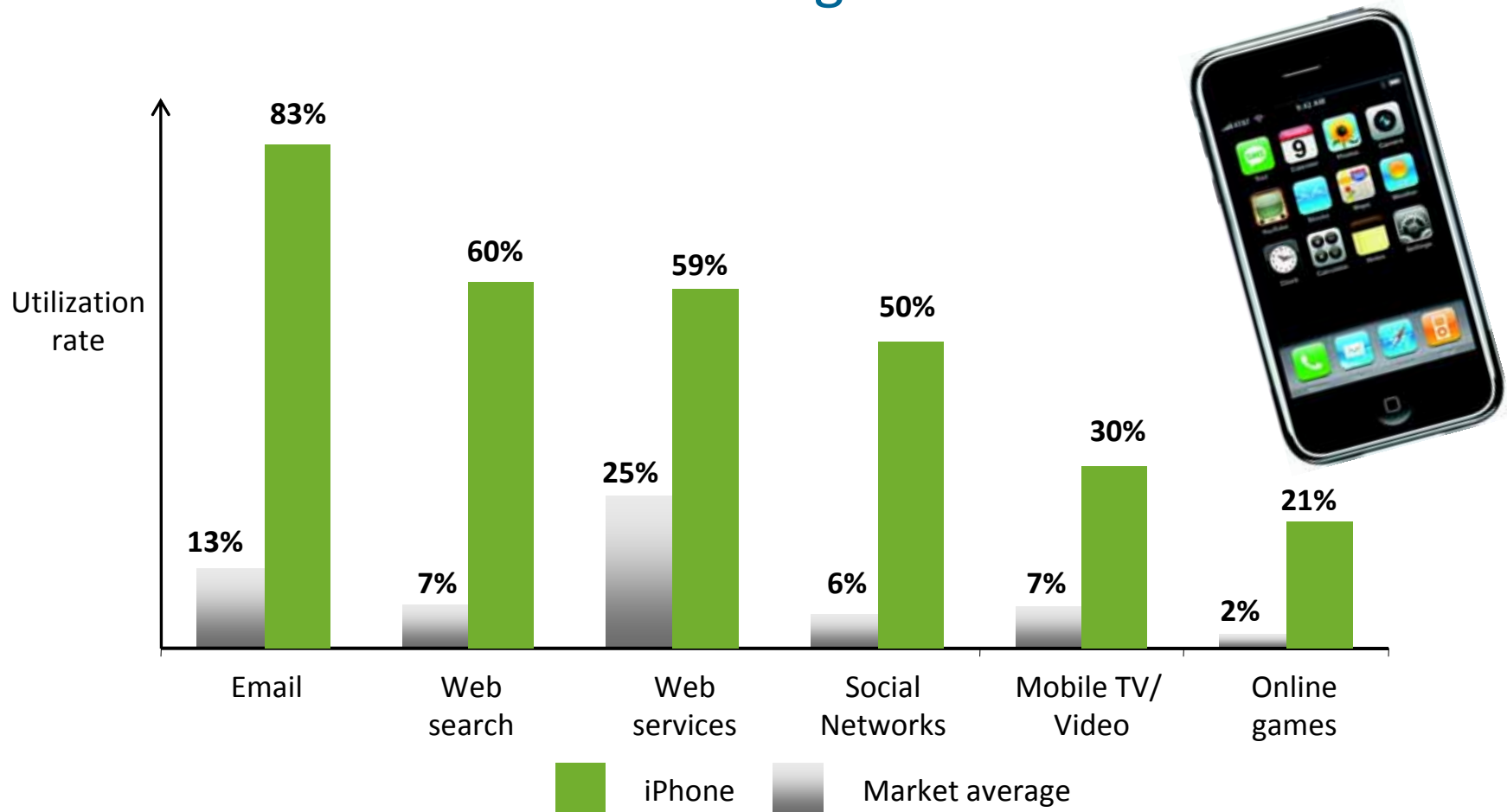


Smartphones market share in Brazil



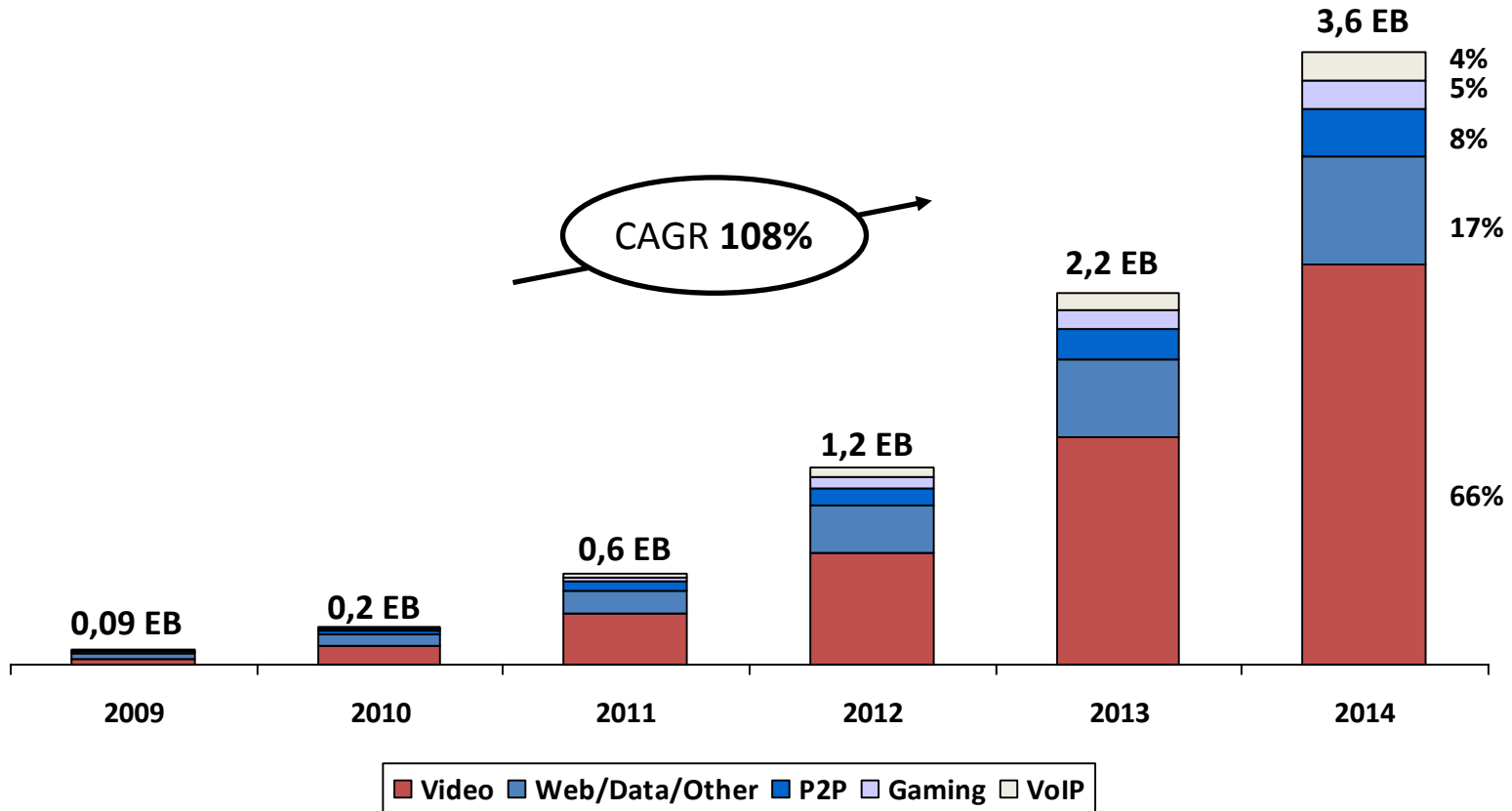
Smartphones are a gaining momentum in Brazil

Trends – Sophisticated devices drive broadband growth



Improved user experience drive broadband growth

Trends - Mobile Data Traffic Growth



Video will drive mobile data traffic growth

*EB = Exabyte = 1.000.000 TB; Source: Cisco Visual Networking Index 2009 - 2014

Devices evolution

- Convergence of communications
 - Communications
 - Web capabilities
 - Multimedia
- Connectivity to various access networks

Users evolution

- User behaviour trend from Wired to Wireless
- End-users utilizing increasingly advanced communications services and applications
 - Same Rich Apps and Services in all environments (Multimedia, High bandwidth, latency dependent)
 - Consistent Quality of Experience
- Individuals becoming content creators

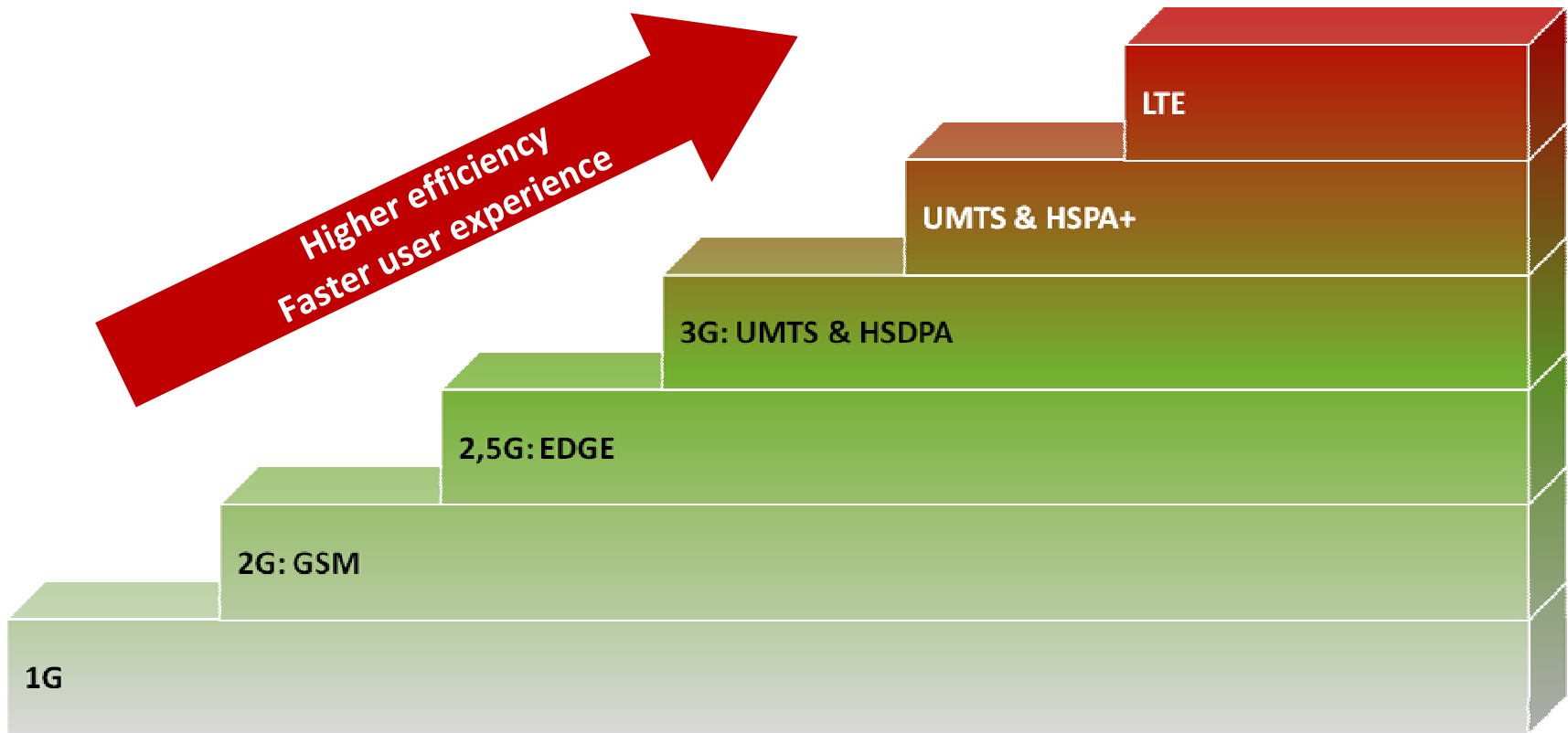


Network evolution

- High data rates
- All-IP Network
- QoS
- Co-existence and integration of different access networks

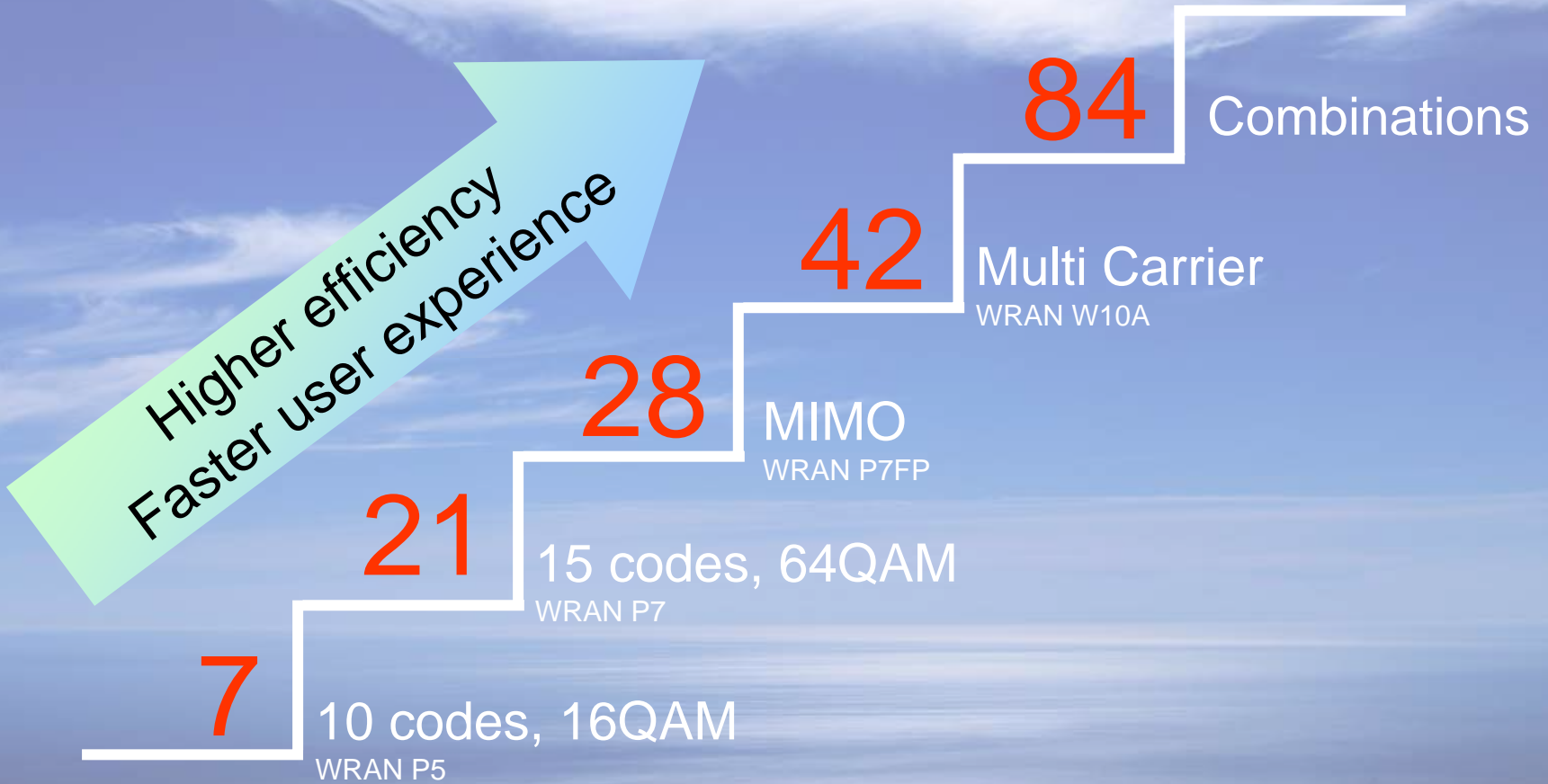
Trends are driving RAN evolution

RAN Technologies Evolution



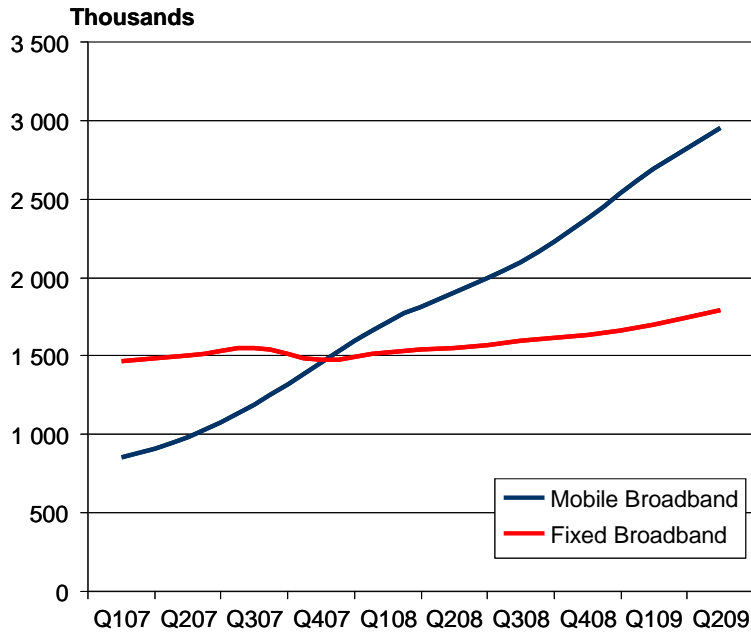
RAN technologies evolving towards LTE

HSPA Evolution



Portugal

All on HSPA Evolution



- 3 million Mobile Broadband subscribers
- YoY growth 55%

**21
Mbps**

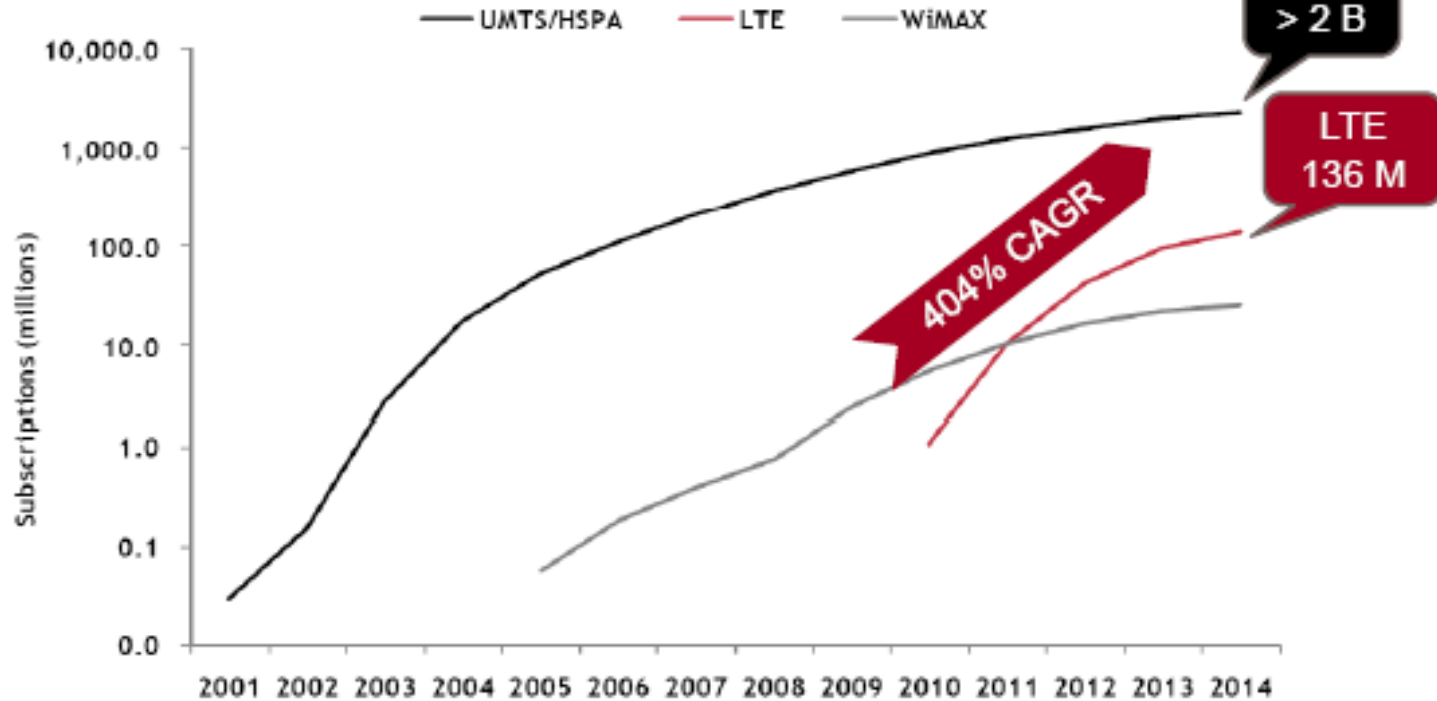
- All three mobile operators launched HSPA Evolution with 21 Mbps



Source: ANACOM, Portuguese telecom regulator

RAN Evolution

Exhibit 1: Comparison of subscriber adoption curves by technology



"(...) Além das vantagens tecnológicas, o LTE começa desde o início a ganhar escala. Pela primeira vez, a maioria dos players, operadores e fabricantes, estão apoiando o mesmo padrão móvel, o que deve contribuir para aumentar os volumes de equipamentos e dispositivos (...)"

Industry forecasts high adoption rates for LTE

RAN Evolution

	UMTS	HSPA	HSPA+	LTE
Networks in service	346	325	42	2
Countries in service	140	137	24	2
Networks Planned/In deployment	79	92	N/A	135

137 LTE operations in 55 countries to be deployed
Up to 25 LTE networks in service by end 2010

High number of LTE commitments

Backhaul bottleneck

GSM

14.4 Kbps

2.5G/3G

384 Kbps

HSPA

3.6 Mbps

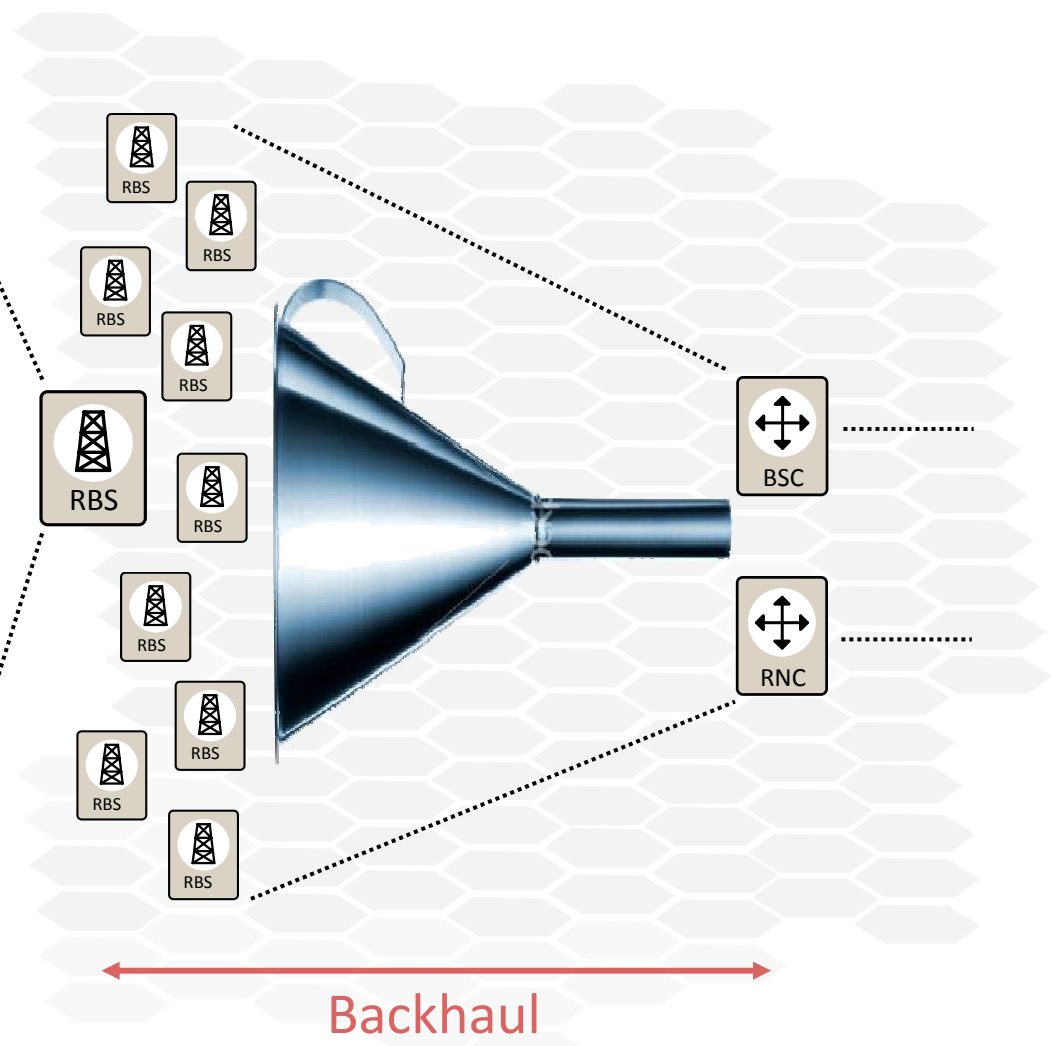
HSPA+

14 Mbps

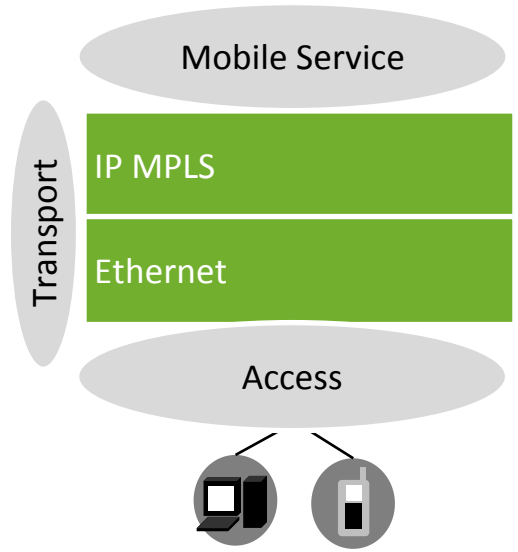
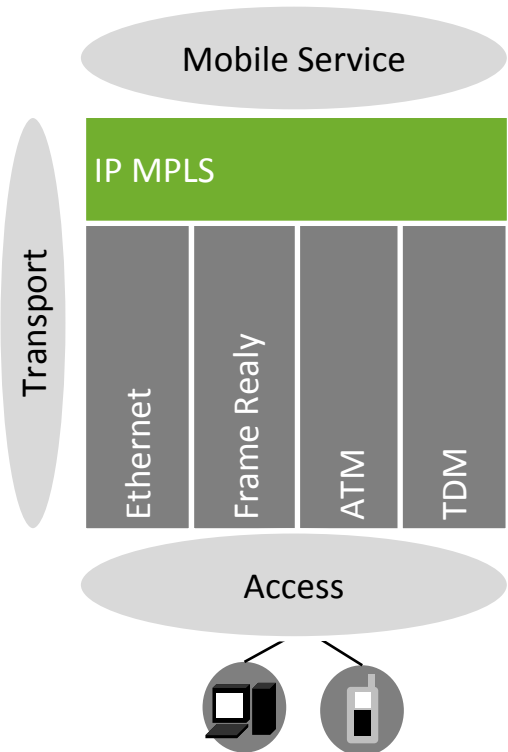
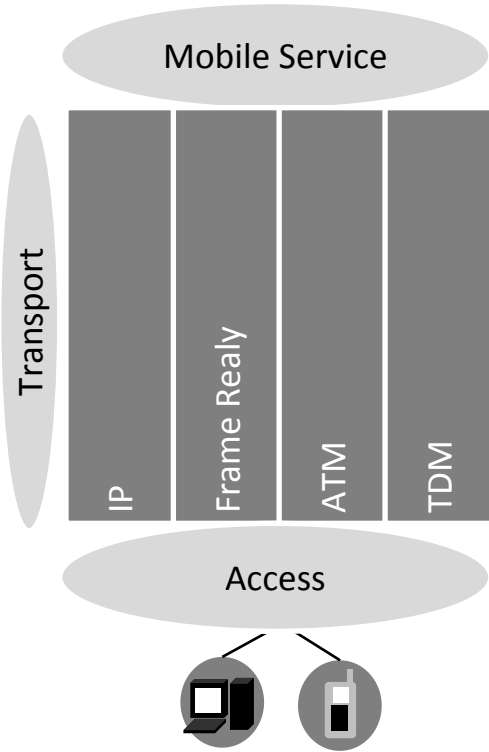
42 Mbps

LTE

80-160 Mbps



Network Architecture evolution



Evolution → Integrate and Simplify

1 IP extension to access layers

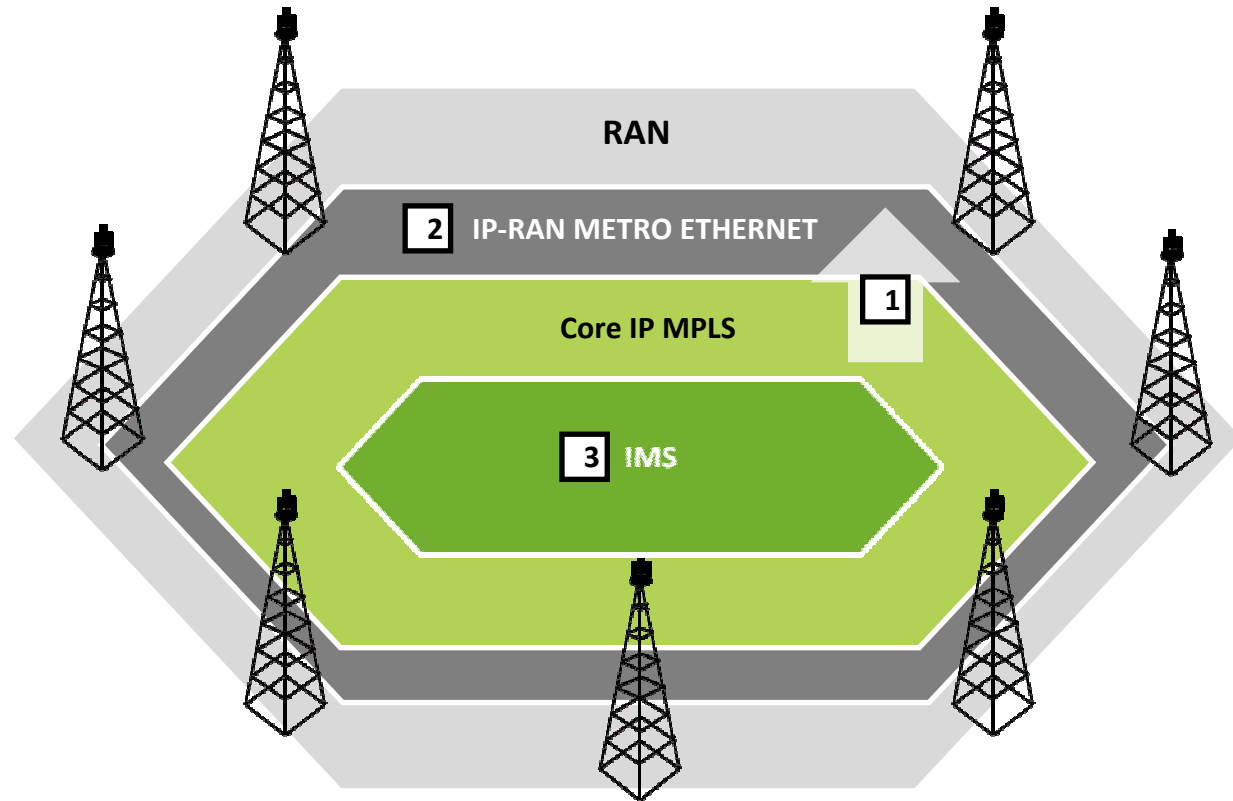
- Traffic optimization
- Flexibility in expansions

2 MetroEthernet

- IP-RAN enabler

3 IMS

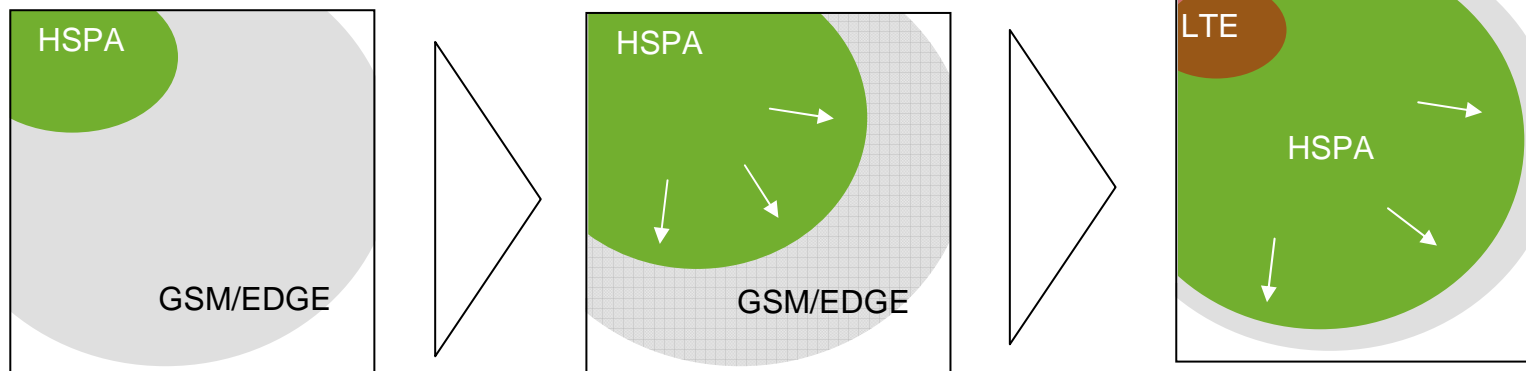
- LTE and current access networks integration enabler
- New Services



RAN evolution - Coverage expansion



- ▶ GSM coverage of today normally very good
- ▶ HSPA coverage still not showing its full potential
- ▶ LTE is around the corner but will not provide country-wide coverage in many years



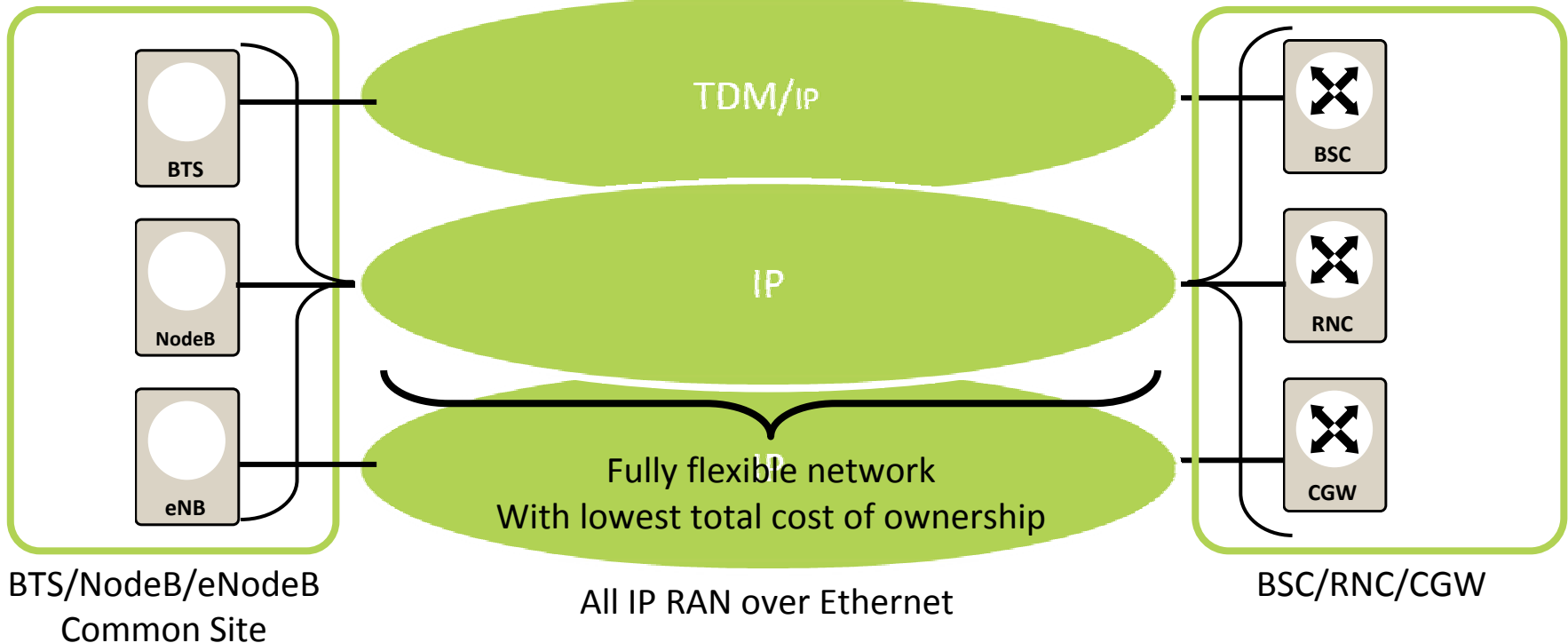
HSPA coverage will grow before LTE large scale deployments

Optimize Communication Networks

IP upgrade
Single interface
Native IP/Eth

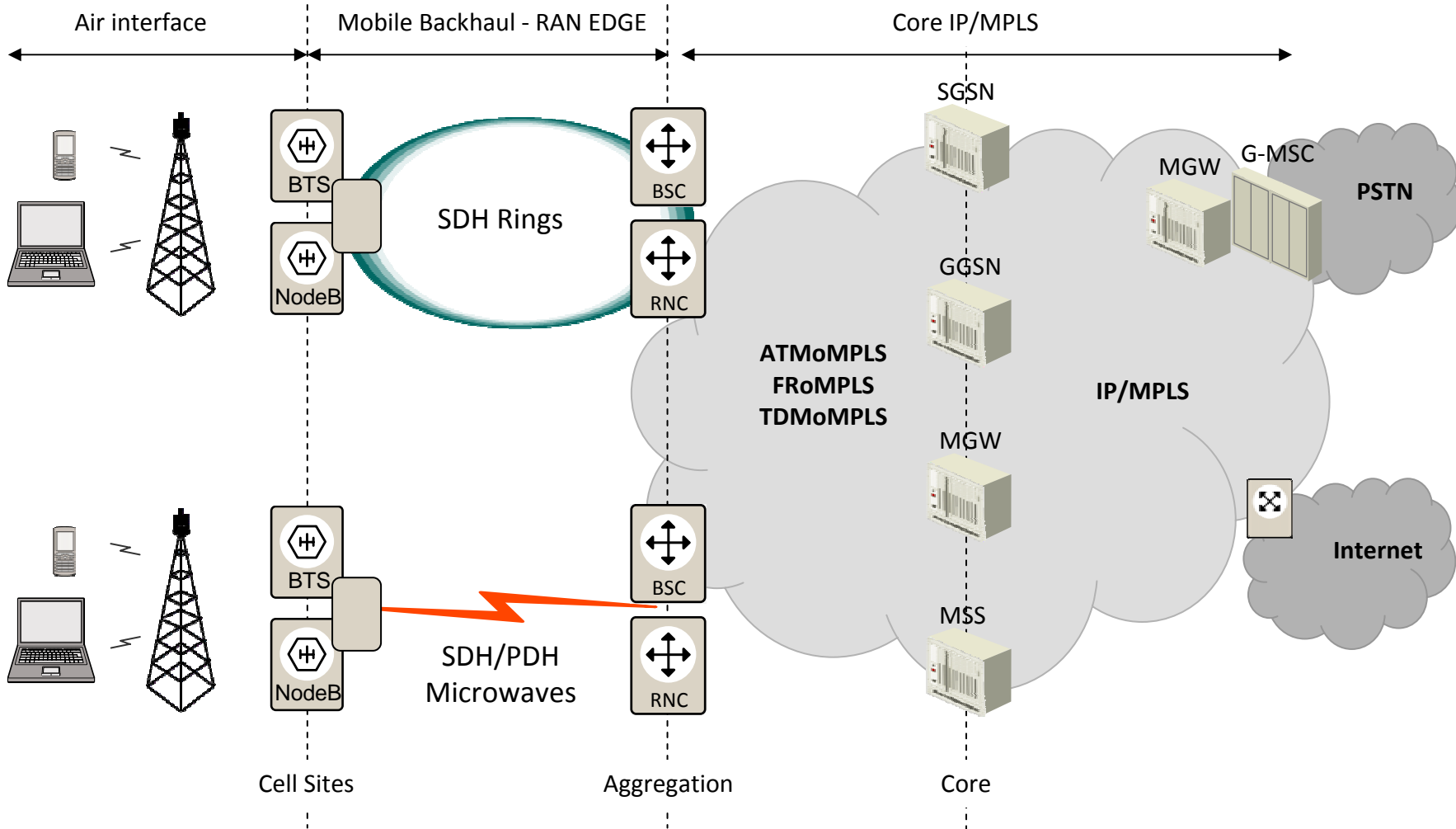
IP upgrade
Single interface
Native IP/Eth

Aggregation

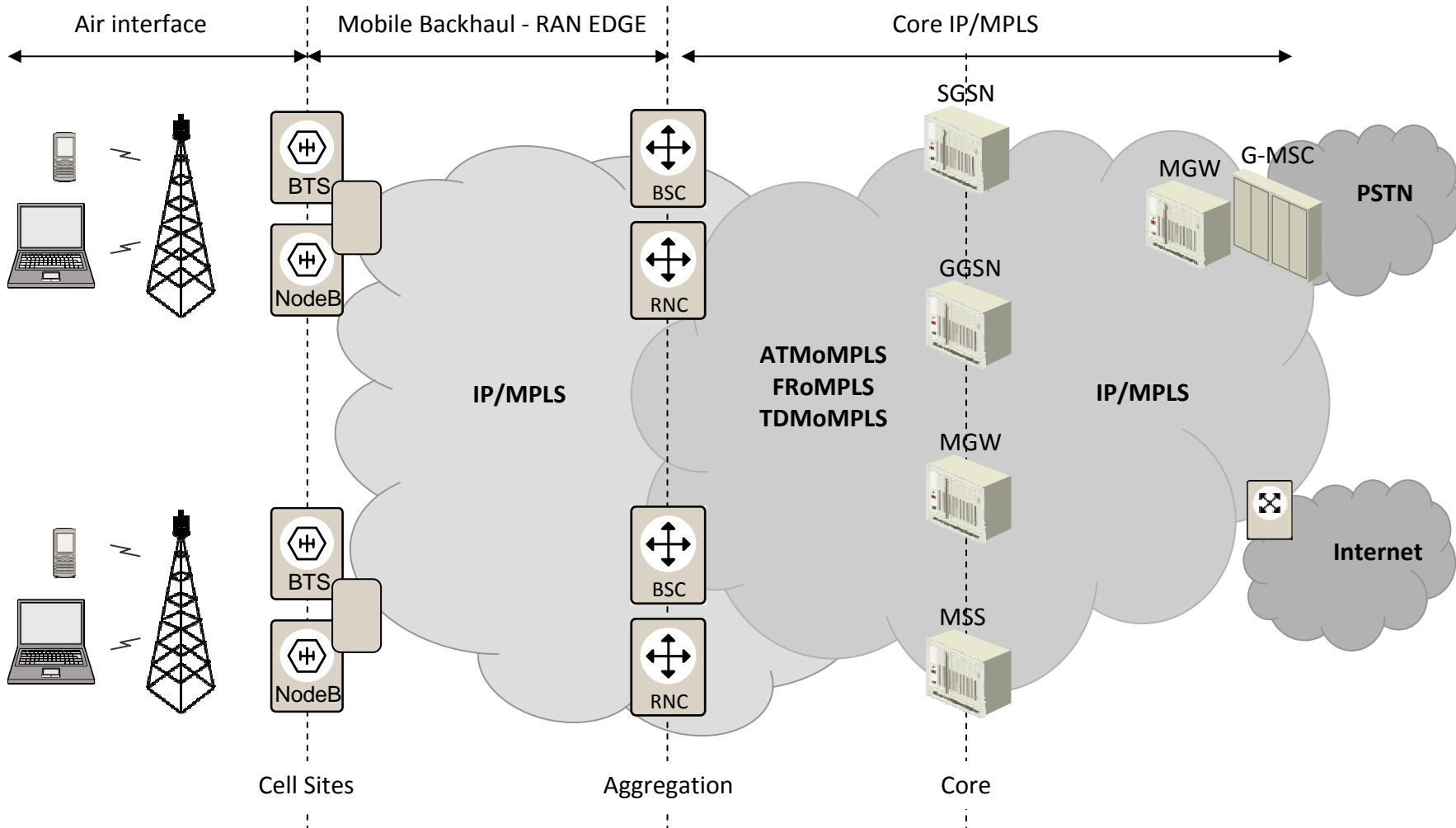


GOAL: ONE SINGLE IP TRANSPORT INTERFACE @ RAN

Network Architecture evolution

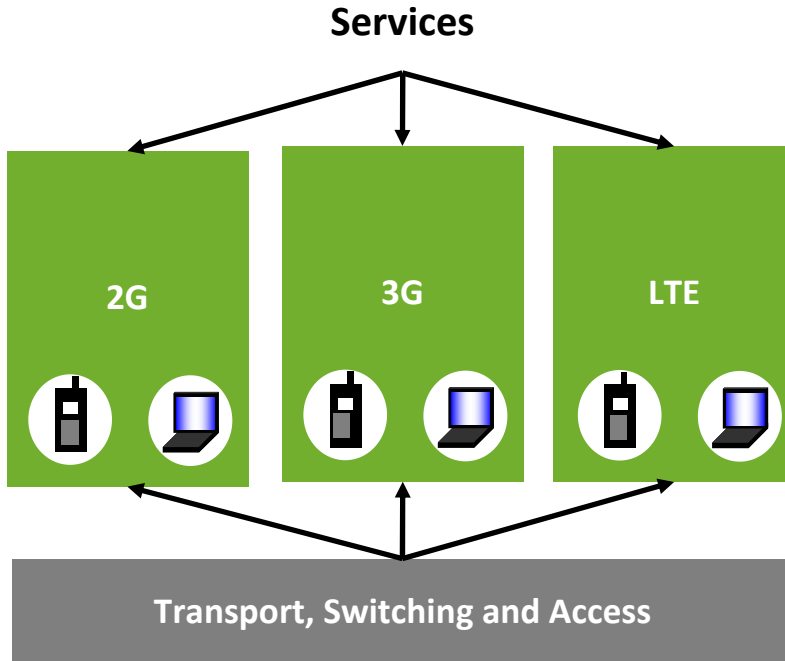


Network Architecture evolution

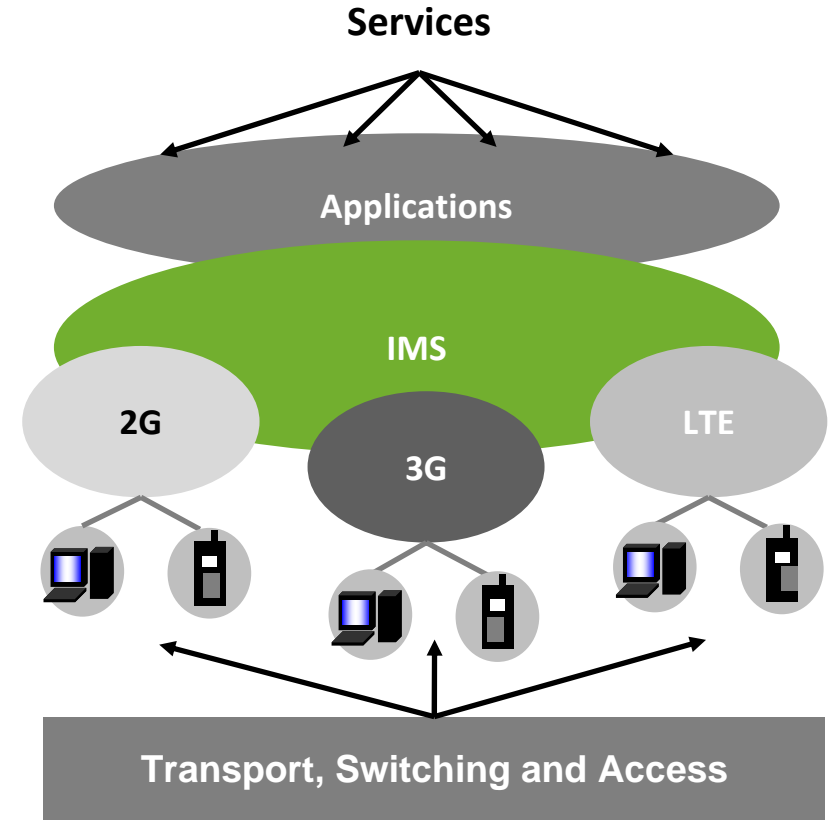


IMS

Redes Segmentadas



IMS



IMS as the enabler of LTE and current access networks integration

Key Takeaways

- **Trends are driving RAN evolution**
 - Mobile Broadband is likely to overtake Fixed Broadband in 2010
 - The device we formerly knew as the cell phone is evolving into an Internet-enabled consumer device
 - Video will drive mobile data traffic growth
- **RAN technologies evolving towards LTE**
 - Strong industry drivers for LTE
 - Industry forecasts high adoption rates for LTE
 - High number of LTE commitments worldwide
- **Backhaul bottleneck**
- **Network architecture evolution demands**
 - All-IP Transport convergence
 - RAN evolves to IP and the Backhaul evolves to Ethernet
 - IMS as the enabler of LTE and current access networks integration



Thank you!

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