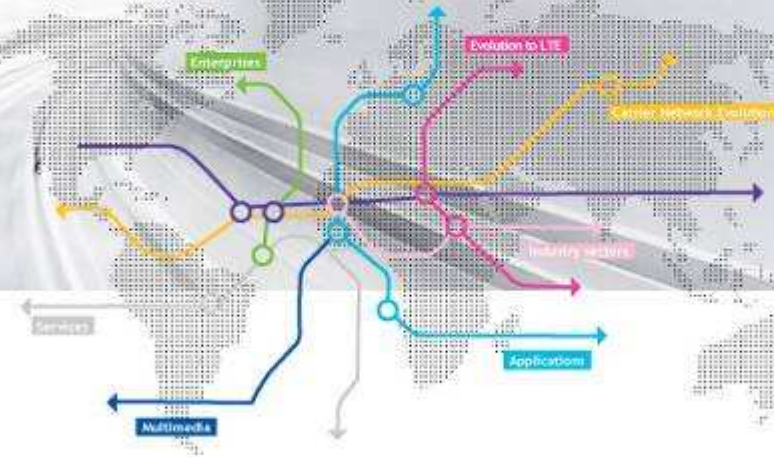


LTE - Enhancing the Wireless Quality of Experience

Münchner Kreis
Sep 24th, 2010



1

Market View



Market evolution towards ubiquitous broadband



Growing mobile adoption

By 2011 roughly 5 billion people will be carrying mobile phones !

Rise of the millenials

The Millennials generation born and/or raised with Internet (11-25 years old)

Within 5 years, millennials will spread their “early-adopters” life style into their adult lives & enterprises

New applications

Fixed broadband life
Massively adopted now and “exportable” to mobile

Google Video BETA
YouTube

Rich ecosystem

My life in my handset
New generation of devices and communicating machines

Connected broadband life style soon becomes mainstream...



What we see in the market

Massive data take off confirmed ...



A Wireless broadband virtuous cycle leading to massive data take off

Industry prayed for it to happen, need now to face it

informa
telecoms & media

2013 = **17** x 2008

ABIresearch®

2014 = **14.7** x 2008

Mobile data volumes	19.2Exabytes (2013)	1.3 Exabytes (2008)
Devices driving the usage	Embedded 3G/4G modems = 1/2	Add-on 3G modems = 2/3
Region leading the data traffic	APAC = 28%	Europe = 31%

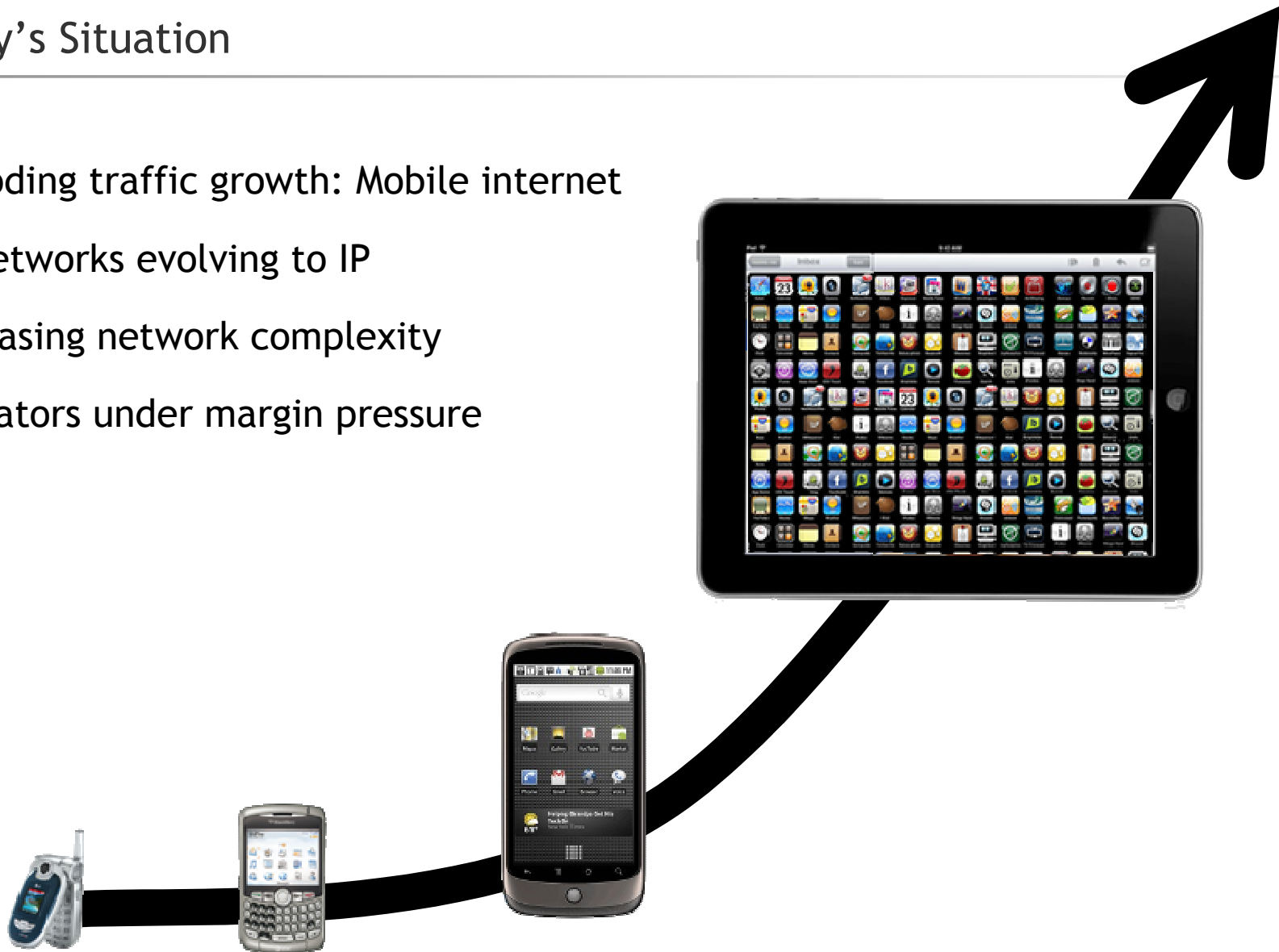
Today's Situation

Exploding traffic growth: Mobile internet

All networks evolving to IP

Increasing network complexity

Operators under margin pressure



2

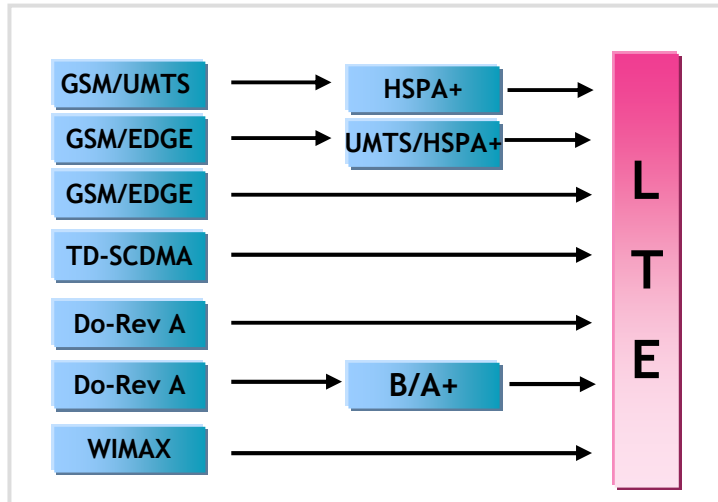
LTE Background



LTE in a Nutshell

A common evolution path...

...introducing highly efficient technologies



OFDM

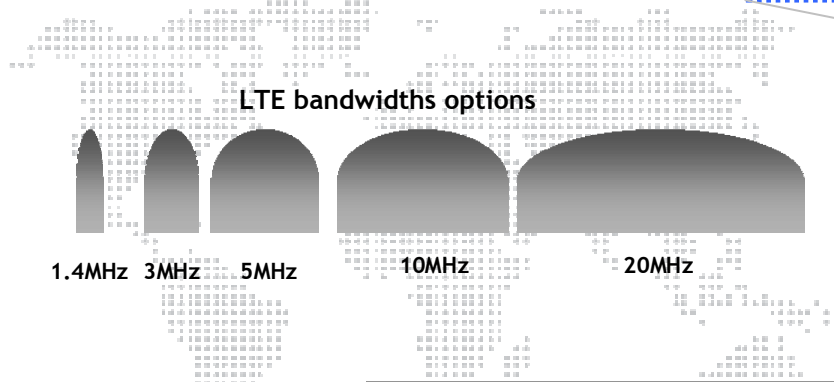
Robust modulation in dense environments
 OFDMA (DL) / SC-FDMA (UL)
 Increased spectral efficiency.
 Simplified Rx design - cheaper
 UE Scalable - go beyond 5 MHz limitation

MIMO

Increased link capacity
 Multiple-input, multiple-output UL& DL.
 Collaborative MIMO (UL).
 Overcome multi-path interference

Flat IP

Flat, scalable
 Short TTI: 1 ms (2 ms for HSPA). Backhaul based on IP / MPLS transport. Fits with IMS, VoIP, SIP



IMT-2000 family

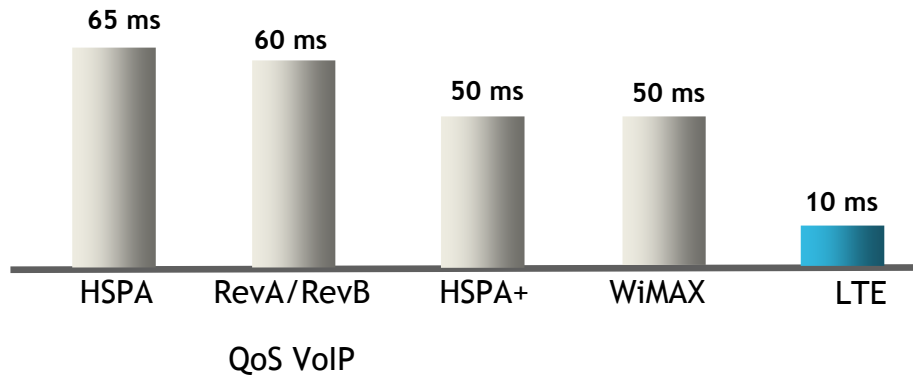
IMT-Advanced family
 Definition in progress by ITU-R

LTE introduces the building blocks of 4G

- 100 Mbps peak, mobile
- 1 Gbps peak, fixed

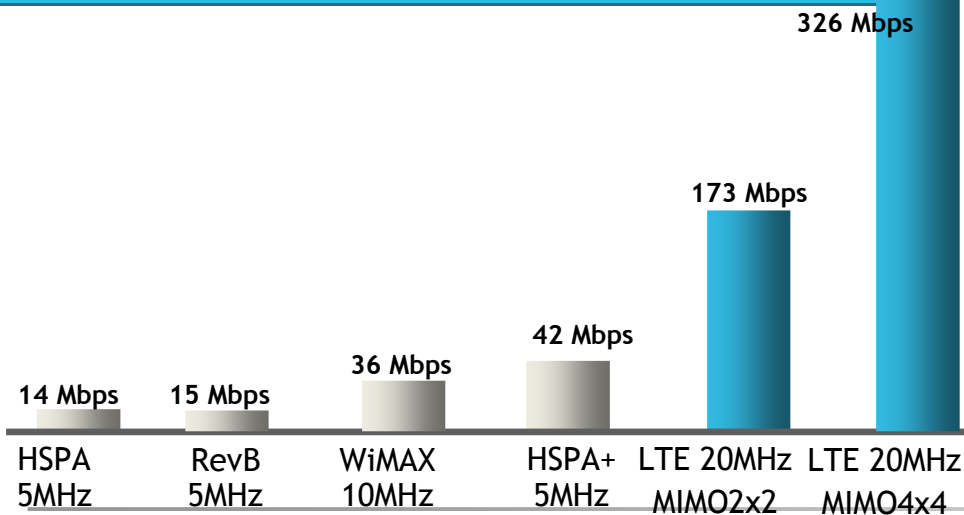
LTE compelling performances

Latency Reduction



Low latency enables fast channel adaptation therefore allowing high speed applications

Higher Peak throughput



- HD TV
- User created content
- Multi-screen
- Gaming
- More...



High peak throughput enables rich content applications over LTE

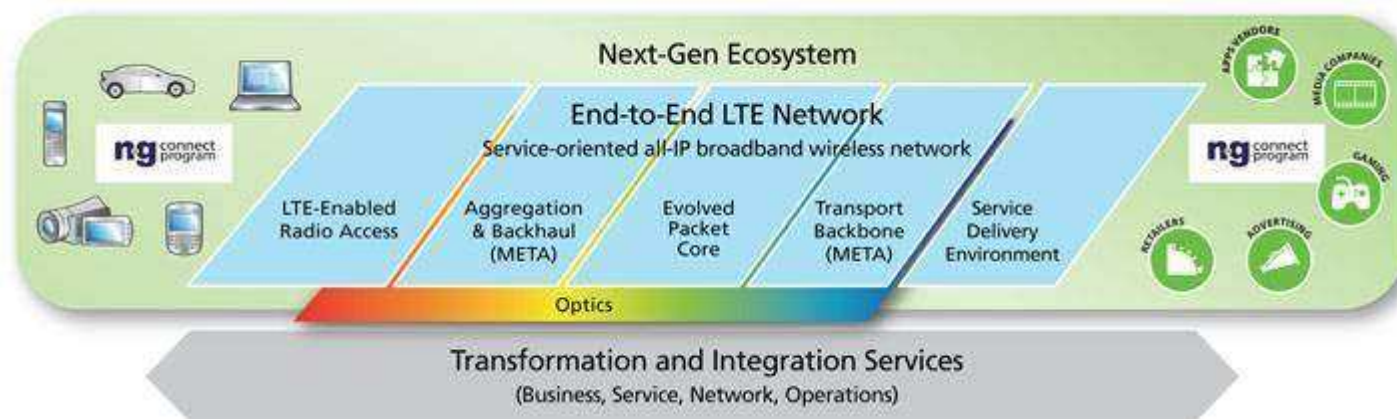
3

End-to-End 4G/LTE Solutions Overview



Alcatel-Lucent Ultimate Wireless Broadband End-to-End LTE solution: Redefining the wireless experience

- End-to-end LTE network with next-generation IP service delivery and wireless innovations
- A comprehensive ecosystem of device, content and applications partners enabling new business models
- Broadband IP transformation leadership: de-risk evolution

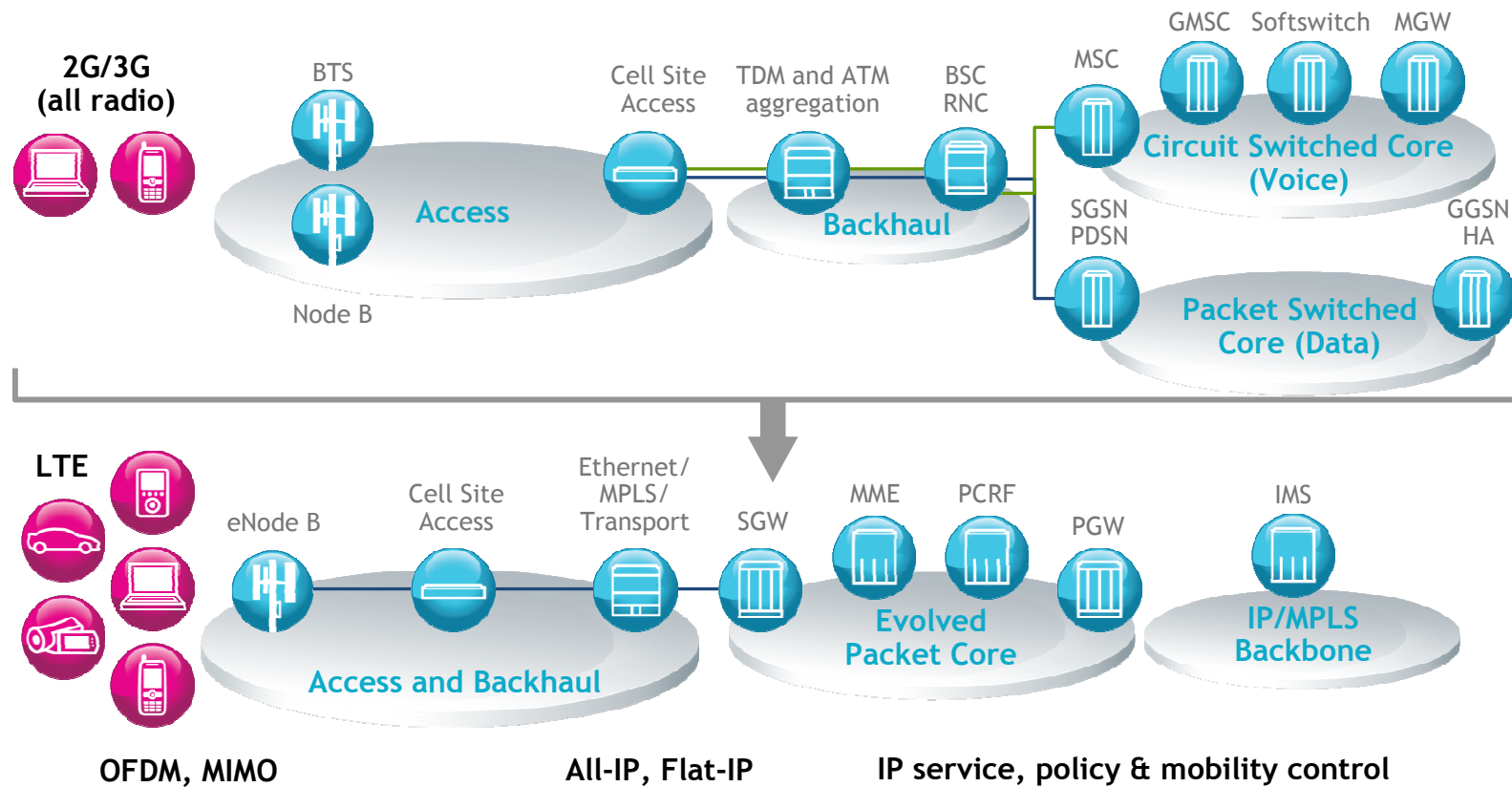


The industry's most comprehensive end-to-end LTE solution,
from the trusted leader in broadband IP transformation

Architecture: End-to-end IP transformation is critical to enable new business model



Scalability * Cost efficiency * Service agility



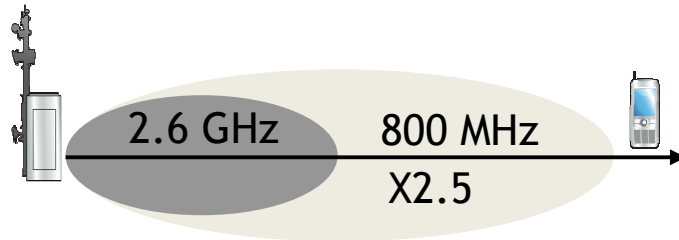
4

LTE Solutions for specific Markets:

- European Digital Dividend



LTE FDD 800MHz in Rural Environment



Main parameters:

- PS 500kbps service at the cell edge
- 40m Antenna Height
- Rural in car

Typical cell ranges for LTE show a significant advantage of using lower frequencies

Better indoor penetration

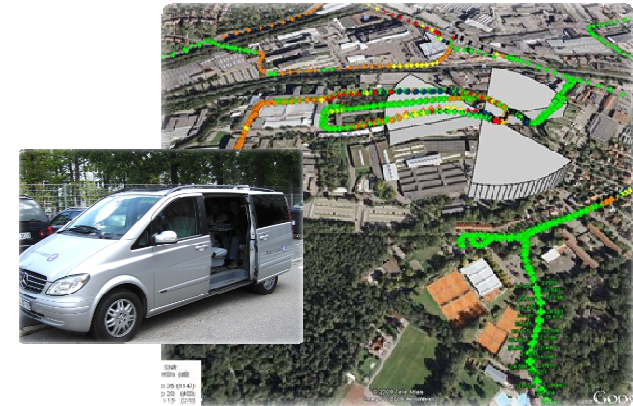


For rural environments, cell count can be cut by 6x for the same area coverage

Digital dividend - LTE 800

Alcatel-Lucent LTE800 highlights:

- Nov'09: Alcatel-Lucent achieves world first LTE800 OTA call in Stuttgart campus
- Dec'09 German IT-summit ALU showcases LTE800 to German chancellor Angela Merkel
- March'10 Alcatel-Lucent showcases LTE800 drive test at Vodafone hall at Cebit'10
- April/May'10: German auction of 800 MHz frequency band
- Q3'10: Alcatel-Lucent commercial support of LTE800 with TRDU2x or RRH2x



5

LTE Trials and Deployments



Validation of our LTE solution by major operators

8

Americas trials

AWS, 700MHz, PCS, 2.6GHz

12

APAC trials

FDD, TDD, small cells, 1.8MHz, 2.3GHz, 2.6GHz, 2.1GHz

18

EMEA trials

FDD, TDD, small cells, 1.8GHz, 2.6GHz, 800MHz, 2.1GHz

2


large scale commercial contracts

40+

LTE trials worldwide

Only end-to-end LTE network provider (EUTRAN+EPC+IMS) - First-mover: LTE commercial services to launch in 25-30 cities in 2010. **CONTRACT**

1800MHz testing




700MHz and AWS testing

700MHz and AWS, commercial service in 2011. **CONTRACT**

TD-LTE and LTE FDD testing coexistence in 2010

Selected for Shanghai Expo 2010, first major public trial of TD-LTE - Showcasing TD-LTE technology to over 70million predicted visitor



Alcatel-Lucent Establishing Clear Market Leadership



6

End-to-End LTE Live Network in Stuttgart



End-To-End LTE Live Network in Stuttgart

- Alcatel-Lucent established an End-to-End Solutions Lab in Stuttgart

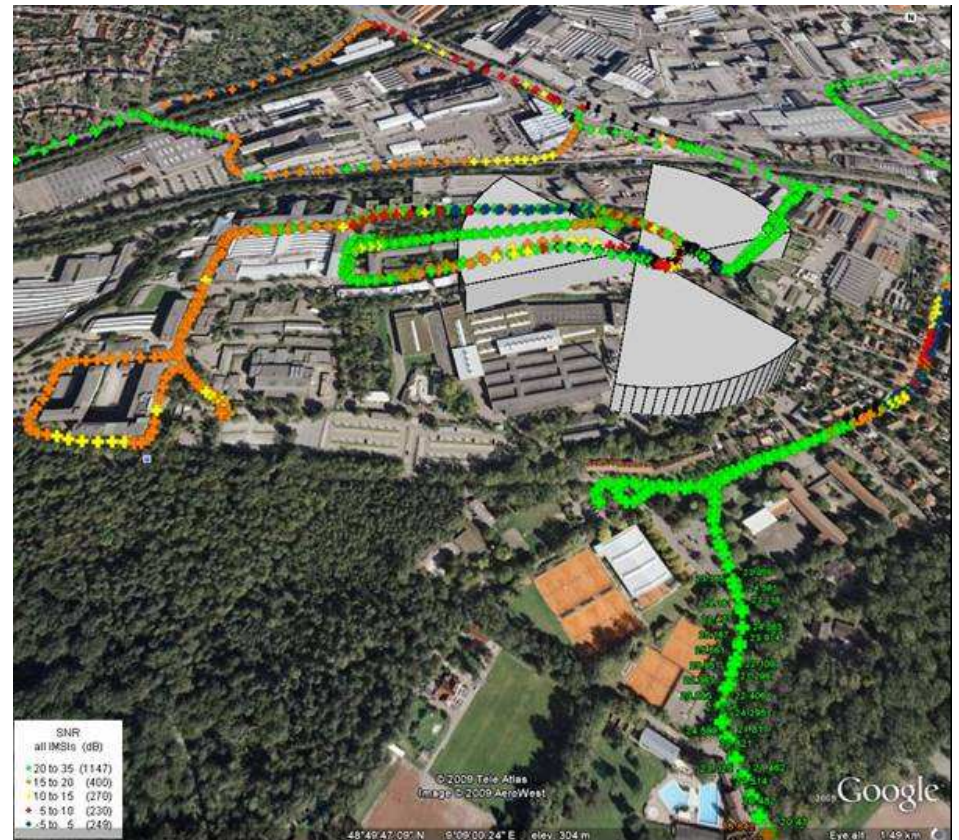
- 1st LTE calls: March 2009 @ 2.1 GHz/10 MHz; July 2009 @ 2.6 GHz/10 MHz

- Addressing End User Experience

- low latency/high bandwidth applications (ngConnect program)

- Network characteristics addressed

- 10/20 MHz bandwidth
- 800 MHz European Digital Dividend Band
- Self-Organizing Network (SON) Features
- LTE-FDD & TDD
- IMS, VoLGA (Voice over LTE), interworking with 2G/3G
- Home base of the LTE Connected Car Europe
- 7 sites incl. DVB-SH / LTE coexistence



7

The ngConnect Program



The ngConnect Program Industries and Focus Areas

Accelerate Services, Understand Impacts, Broaden Landscape

Next Generation Broadband is about more than just speed...

Alcatel-Lucent has brought together stakeholders from traditional and non-traditional industries to:

- Accelerate deployment of **new services and devices**
- Drive **new sources of revenue** with new business models
- **Broaden the device landscape** to consumer electronics, machine-to-machine, and automotive



Working with the next generation of applications, content and connected device providers to develop the market for high bandwidth services in **5 Focus Areas**

Consumer Media & Entertainment

Enterprise Collaboration & e-Healthcare

Automotive Connectivity

Digital Signage

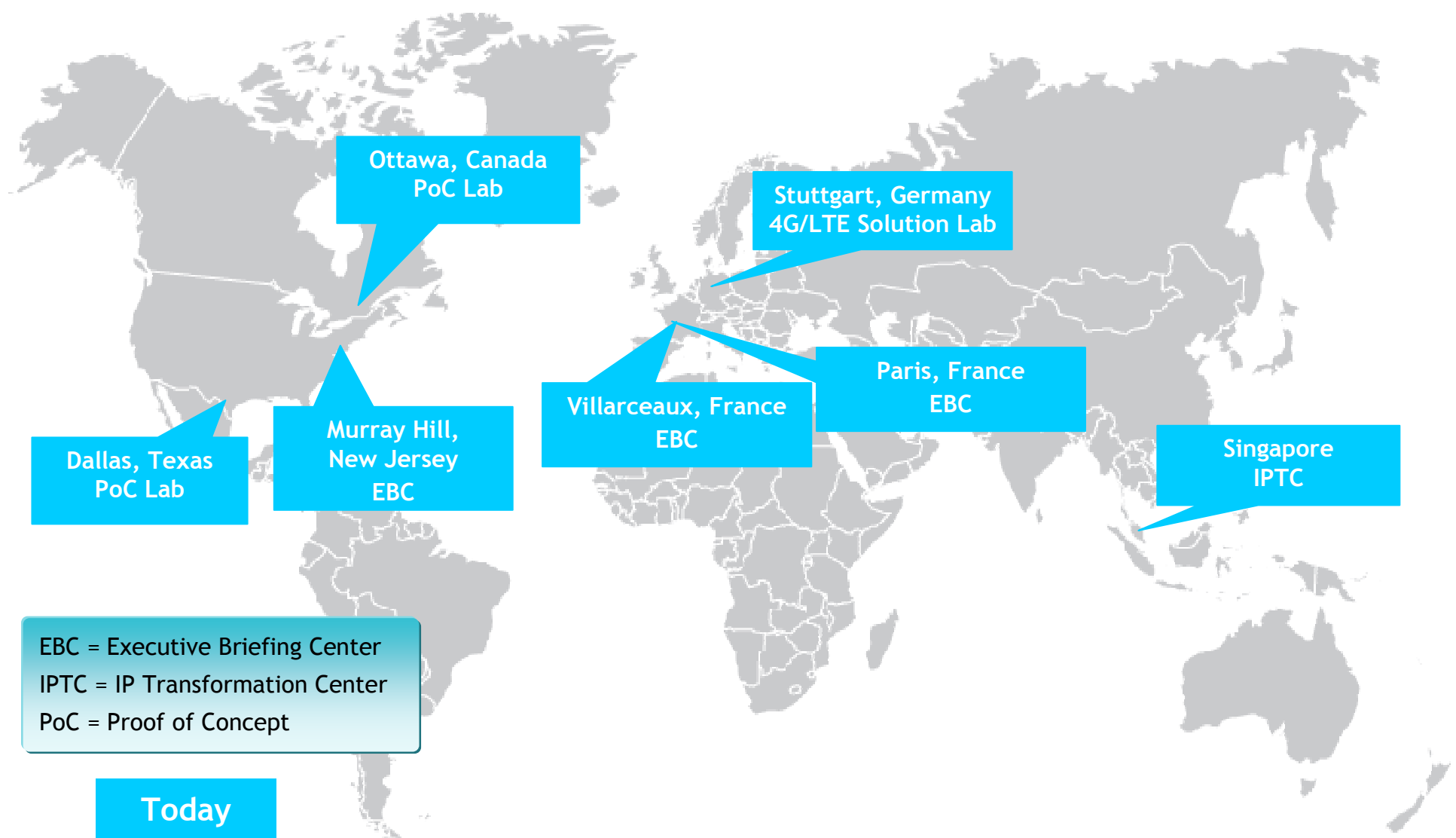
Computing Experience

ngConnect Members: *Leading innovators and market leaders reshaping the way people communicate*



Where can you see these demos?

Alcatel-Lucent Innovation Labs and Demo Locations for ngConnect



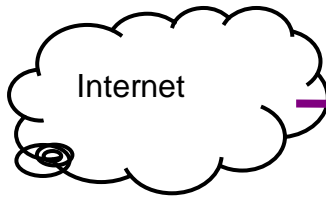
8

ngConnect LTE-enabled Applications:

- Digital Signage
- Mobile Gaming
- LTE Equipped Car
- eHealth Monitoring
- LTE connected Camera

Digital Signage

SIGNEX



Instant Convergent Charging

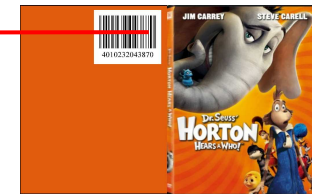
ICC 8610

Media Server



Mobile Users

Barcode Scanner



Digital Signage

Customer opportunity / business challenge:

- **Digital Signage will be a key application**
- LTE enables **networked and social advertisements** to break from the current form factor to allow for much higher quality and dynamic experience

Business value for our customers:

- Provides **higher value to advertisers** - instant update of content on digital signage
- LTE connected digital signs can support Video in **remote locations** not connected via broadband
- **Reduces cost of deployment** for digital sign advertisers and providers

Mobile Gaming

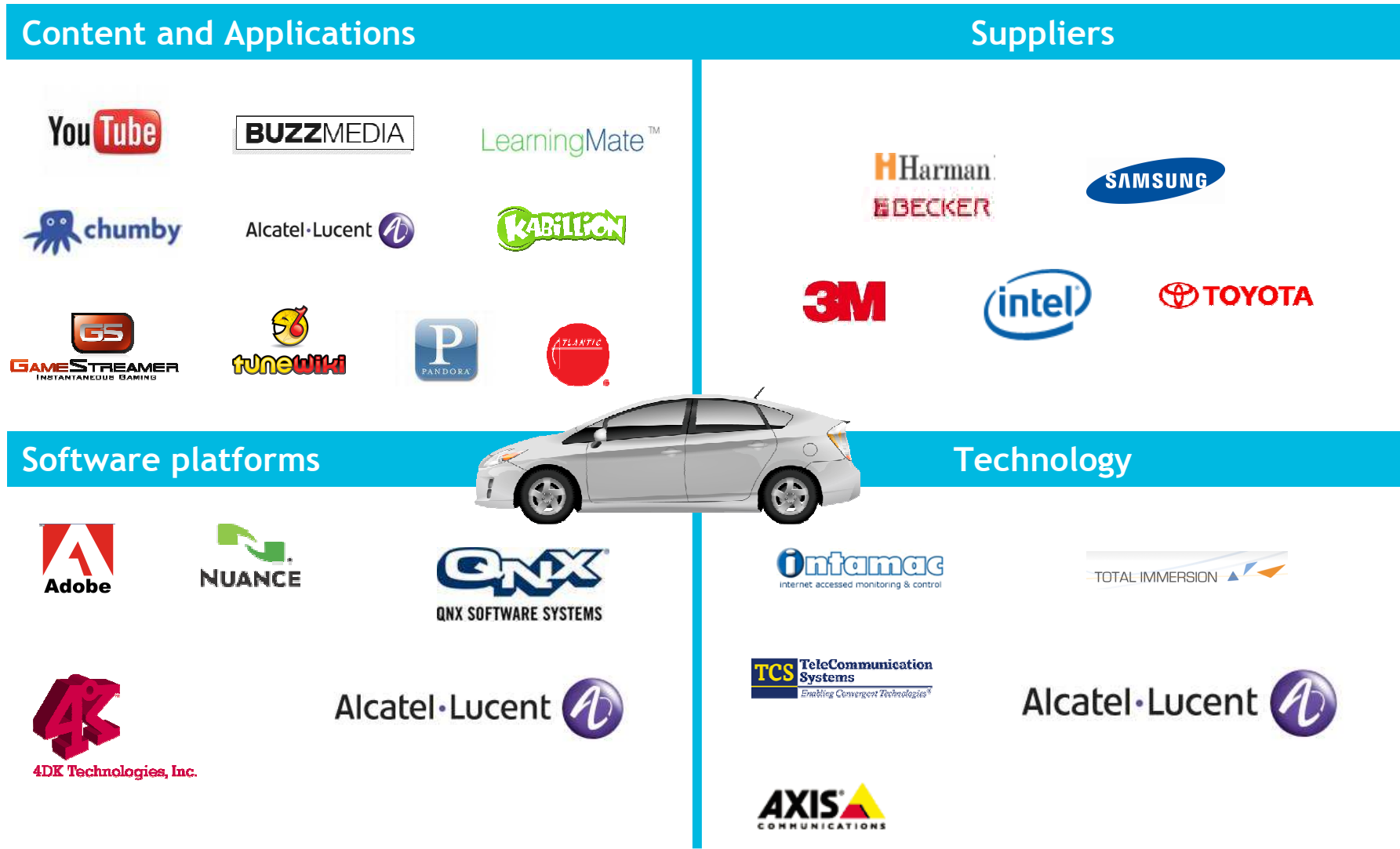
This demonstration provides an example of a high-quality mobile interactive gaming experience over mobile broadband

- The high bandwidth and low latency of 4G/LTE enables networked and social games to break from the current mobile form factor to allow for much higher quality gaming experience on any wired or wireless device

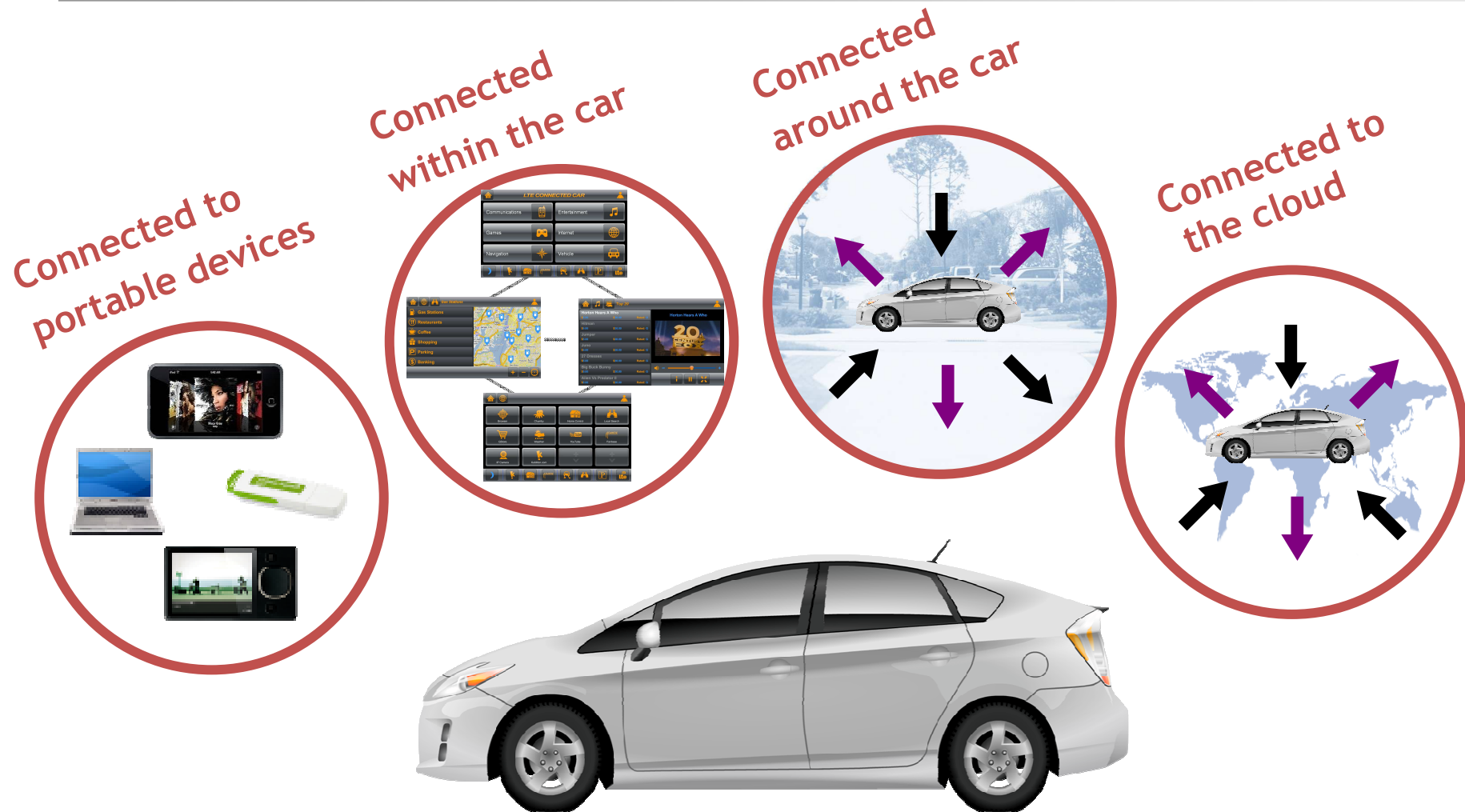


Contributing Members: FISHLABS, Alcatel-Lucent

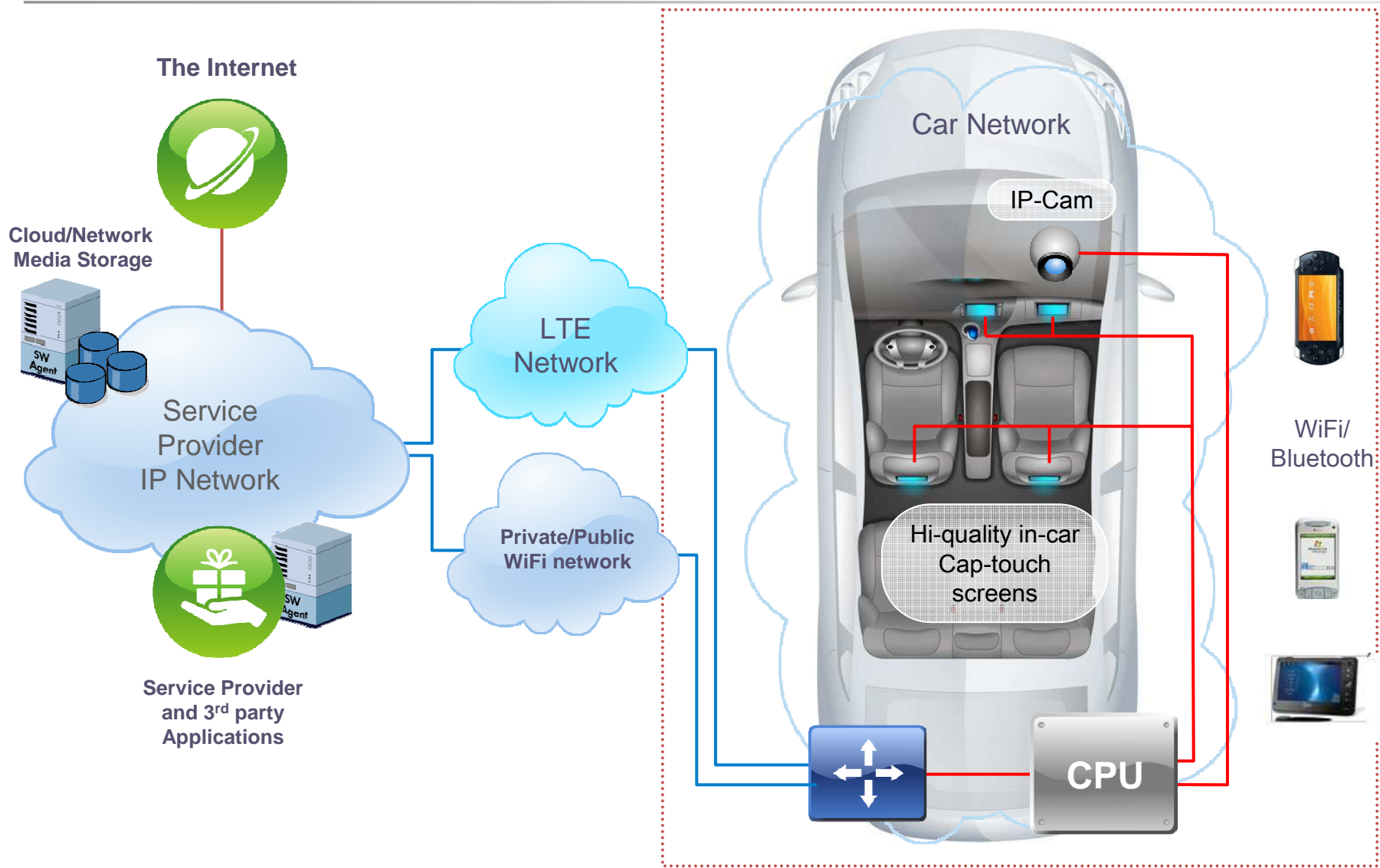
ng connect program LTE Equipped Car Project participants



The LTE Equipped Car Concept



Intelligent Network + In-Car Hardware and Software = LTE Equipped Car Concept



Services and Capabilities in the Concept Vehicle

Video-related services

- On-demand movies (streamed/downloaded from network)
- Kabillion Kids VoD Service (On-Demand Kids content)
- Access to “MyPVR” personally recorded TV via network storage
- Access and remote control of IP camera(s) in home, car-car
- YouTube

Audio-related services

- Pandora Internet radio
- Atlantic Records Fanbase
- On-demand music store
- Access to personal media devices via Wi-Fi/Bluetooth and plug-in. and connect

Gaming services

- Game store: download and play
- In-car and out-of-car: Single and Multi-player

Navigation services

- Local search
- GPS augmented by P.O.I overlay on maps

Vehicle wellness services

- Maintenance tracking and notification
- Virtual mechanic
- Car to Car sharing of road and safety conditions
- Schedule service appointments via Web

Communication and connection services

- Hands-free mobile communication services
- Network-based value-added services, e.g., voice recognition
- Access to widgets and social networking
- In-car broadband Internet access via Wi-Fi
- Home control

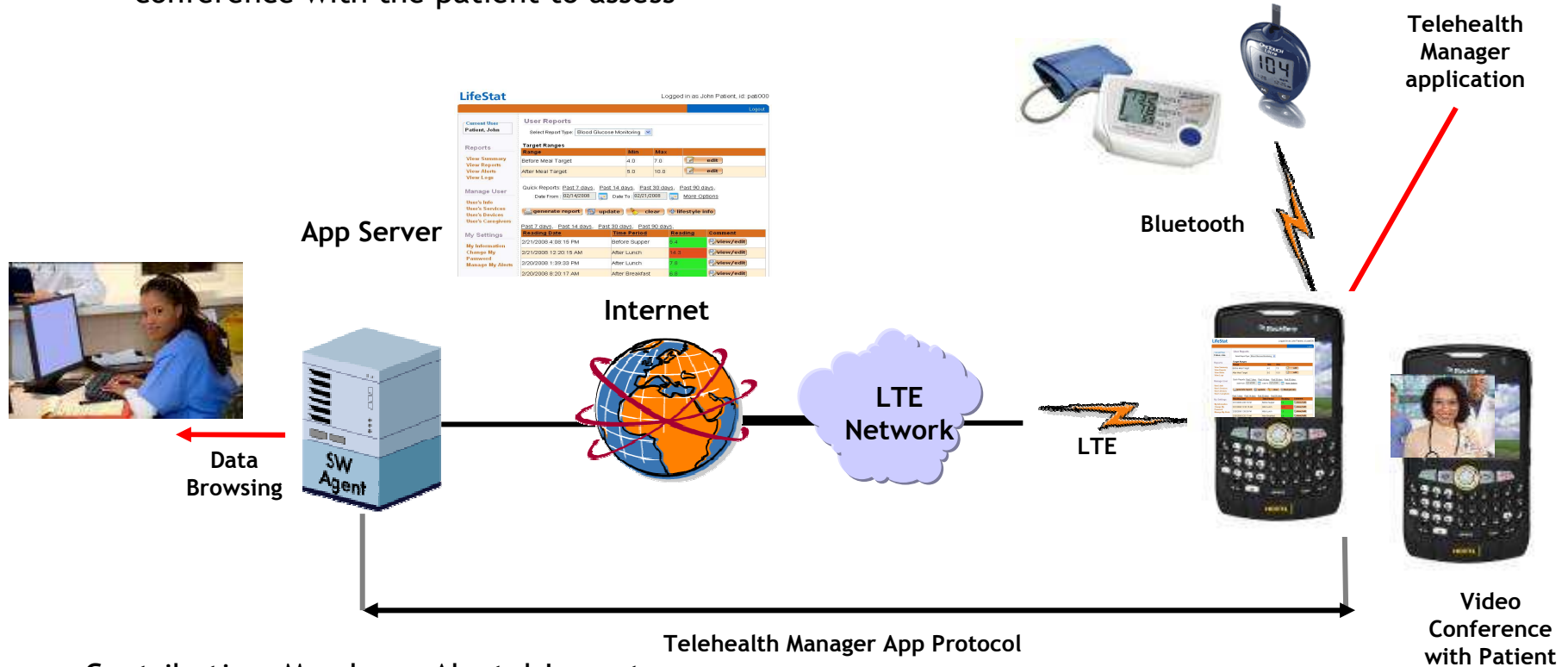
Enable new business opportunities



e-Healthcare w/ video over LTE

TeleHealth Monitor – BlackBerry example

The Remote Health Monitoring Solution Concept demonstrates diabetic blood glucose and hypertension measurements via a 3G/4G cellular network allowing continuous, simple ANYTIME, ANYWHERE patient care. Enabled over the LTE network offers the nurse the ability to gather patient data and if concerned, set up an instant video conference with the patient to assess



Contributing Members: Alcatel-Lucent

eHealth Monitoring

- An European Digital Dividende Application
- EDD enables remote monitoring of elderly people having chronic illnesses can receive optimal care without traveling to medical facility at the country side, like e.g.
 - Anytime, Anywhere diabetic blood glucose measurement
 - Anytime, Anywhere blood pressure measurement
 - Instant LTE transmission of eHealth measurements for review by Health professional
 - Instant LTE transmission of home based (personal mobile device) user generated video presenting physical symptoms for health care professional to view.

Health Monitoring and Alerting (Output to Monitor)

Current User
Patient, John

Reports

[View Summary](#)
[View Reports](#)
[View Alerts](#)
[View Logs](#)

Manage User

[User's Info](#)
[User's Services](#)
[User's Devices](#)
[User's Caregivers](#)

My Settings

[My Information](#)
[Change My Password](#)
[Manage My Alerts](#)

User Reports

Select Report Type: Blood Glucose Monitoring ▼

Target Ranges

Range	Min	Max	
Before Meal Target	4.0	7.0	edit
After Meal Target	5.0	10.0	edit

Quick Reports: [Past 7 days](#), [Past 14 days](#), [Past 30 days](#), [Past 90 days](#),
 Date From: 02/14/2008 Date To: 02/21/2008 [More Options](#)

generate report
 update
 clear
 lifestyle info

[Past 7 days](#), [Past 14 days](#), [Past 30 days](#), [Past 90 days](#),

Reading Date	Time Period	Reading	Comment
2/21/2008 4:08:15 PM	Before Supper	5.4	view/edit
2/21/2008 12:20:15 AM	After Lunch	14.3	view/edit
2/20/2008 1:39:33 PM	After Lunch	7.8	view/edit
2/20/2008 8:20:17 AM	After Breakfast	6.8	view/edit

LTE Connected Camera

LTE Enabled Camera



LTE Network



Network Hosted App



The LTE Connected Camera demonstrates the speed and flexibility LTE brings to the photography workflow process.

LTE Connected Camera

Customer opportunity / business challenge:

- Limited bandwidth in 3G networks makes large file size of professional cameras (20MB) slow and expensive to upload while mobile
- Leveraging LTE directly in the camera with a powerful cloud based application allows fast, secure upload from anywhere and “on the fly” processing and distribution of photographic assets, metadata and location information/shooting notes

Target market / target customers:

- Professional photographers/agencies (journalist, paparazzo, etc.)
- First responders
- Insurance adjusters, Real estate agents, etc.



9



LTE Connected Boat@Match Race Germany

Connected Boat@Match Race Germany Overview

- LTE Connected Boat@Match Race Germany at Lake Constance
May 19th - 24th 2010
 - First worldwide sports event broadcasted via LTE
 - Cameras on board of sailing boats are connected to Alcatel-Lucent LTE FDD 2,6 GHz system in the uplink enabling live Internet streaming and public viewing
 - More information and pictures available at <http://www.alcatel-lucent.de>
 - Live Internet streaming for the time of the event at <http://www.matchrace.de/display/live-video.php>



Connected Boat@Match Race Germany: A 4G LTE World Premiere Solution

- To transmit videos/pictures from the match race live from the boats a complete LTE (Long Term Evolution) network is installed at Kressbronn / Langenargen
- The network covers the racing area on the Lake Constance in front of Langenargen and Kressbronn as well as the city of Langenargen
- The coverage area is up to 5 kilometers in diameter built with three sectors
- Mobile devices are installed on all racing boats and on one boat accompanying the racing boats
- In the castle of Montfort the TV production center is located to which the live pictures are sent



Connected Boat@Match Race Germany: The 4G LTE Network



The screenshot shows the Matchrace Germany website in a Windows Internet Explorer browser window. The address bar shows the URL <http://www.matchrace.de/>. The page layout includes a navigation menu at the top with links for Skipper, News, Programm, Mitteilungen, and Über Match Race. The main content area features a large banner for the 2010 event, a partner section with logos for BAVARIA, ULTRAMARIN, STIHL, DHL, and Alcatel-Lucent, a news section with a headline about RegioTV, a press box with a headline about Mathieu Richard, and a 2009 ranking list. The right sidebar contains a 'Sponsoren' section with logos for GEROLSTEINER, Druckhaus Müller, and TERACUE, and a 'LIVE VIDEO' section. The Windows taskbar at the bottom shows the Start button and several open applications, including the Matchrace Germany website.



10

Summary

Conclusion

LTE delivers the promise of previous wireless generations

LTE is pillar of our strategy

LTE: 40+ trials; selected by **Verizon** and **AT&T** for commercial networks

Focus on End-to-End approach, complemented by ngConnect ecosystem

Numerous world first LTE demonstrations

Innovation Powerhouse - Bell Labs



A high-angle photograph of four business professionals (three men and one woman) holding hands in a circle. They are standing on a floor with vibrant, swirling patterns in shades of blue, yellow, and red. The background is a blurred, dynamic scene of light trails, suggesting movement and energy. In the top right corner, there is a decorative grid of purple dots.

Thank You!

Questions?

www.alcatel-lucent.com