Car to X Communications
Alcatel-Lucent

Dr. Juergen Weber

2010
LTE in a Nutshell

A common evolution path... ...introducing highly efficient technologies

- GSM/UMTS → HSPA+
- GSM/EDGE → UMTS/HSPA+
- TD-SCDMA → B/A+
- Do-Rev A → B/A+
- WIMAX → LTE

LTE bandwidths options

- 1.4MHz
- 3MHz
- 5MHz
- 10MHz
- 20MHz

LTE introduces the building blocks of 4G

- GSM/EDGE
- TD-SCDMA
- Do-Rev A
- WIMAX

- OFDM
- MIMO
- Flat IP

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

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

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

- 3G
- “3.9G”
- 4G

- 100 Mbps peak, mobile
- 1 Gbps peak, fixed
LTE compelling performances

Latency Reduction

- HSPA: 65 ms
- RevA/RevB: 60 ms
- HSPA+: 50 ms
- WiMAX: 50 ms
- LTE: 10 ms

QoS VoIP

Higher Peak throughput

- HSPA 5MHz: 14 Mbps
- RevB 5MHz: 15 Mbps
- WiMAX 10MHz: 36 Mbps
- HSPA+ 5MHz: 42 Mbps
- LTE 20MHz MIMO2x2: 173 Mbps
- LTE 20MHz MIMO4x4: 326 Mbps

Low latency enables fast channel adaptation therefore allowing high speed applications.

High peak throughput enables rich content applications over LTE.

- HD TV
- User created content
- Multi-screen
- Gaming
- More...
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
ng Connect Members (to date)

Leading innovators reshaping the way people communicate

Consumers Media & Entertainment  Enterprise Collaboration & e-Healthcare  Automotive Connectivity  Digital Signage  Computing Experience

[Logos of various companies]
## Barriers to realizing the vision

1. Bandwidth (access spectrum and network infrastructure)
2. Insufficient indoor wireless network coverage
3. Lack of a standards/open interoperable SDPs
4. Networked device capabilities vs cost
5. Cross application security and privacy
6. Digital Rights Management
7. QoS management across IP and non-IP systems
8. Standards for content delivery & management
9. Applications & clients
10. Poor layout of web content on mobile devices
11. CAPEX availability
12. Restrictive usage tariffs with insufficient flat-rate options
Major network based services/applications to be explored in project

**Video services**
- On-demand movies (streamed/downloaded from network)
- Access to “MyPVR” personally recorded TV via network storage
- Access and remote control of IP camera(s) in home, car-car
- Youtube

**Audio services**
- Internet Radio
- On-demand music store
- Access to personal media devices via WiFi and direct connect

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

**Navigation**
- GPS augmented by “Google Maps” type p.o.i. indicators
- Traffic pattern/aerial weather overlays

**Vehicle Wellness**
- Maintenance tracking and notification
- Virtual mechanic
- Schedule service appointments via Web

**Communication and Connection Services**
- Voice services
- Ntwk based value added services, e.g., voice recognition
- Wireless internet access via WiFi/LTE

**Additional services provided by partners**
- Social networking
- Immersive Music Experience
- Internet widgets

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Actual screen shots from in car platform
Vehicle as Bi-directional Content Terminal
Helping operators capture a new distribution channel

Connected Car via 4th Generation Mobile Networks LTE

The Internet
Cloud/Network Media Storage
Service Provider IP
Service Provider Applications

LTE Network
Service Provider IP
Private/Public WiFi network

Car Network
Hi-quality in-car devices
IP-Cam

WiFi/Bluetooth
Connected Car via 4th Generation Mobile Networks LTE

Private/Public WiFi network
Connected Car Gateway: High Level View

- Public Facing
  - Ethernet
  - LTE
  - 3G
  - WiFi/Client
  - FW
  - Routing

- Private Facing
  - Ethernet
  - WiFi AP
  - Bluetooth

- Firewall and NAT
- DHCP and AP

- External network
- Home network
- Car network
Press Links Connected Car Alcatel-Lucent

**homepage**
http://www.ngconnect.org/ecosystem/connected-car.htm

**press**
http://www.eweek.com/c/a/IT-Management/AlcatelLucent-Toyota-Drive-LTE-Connected-Concept-Car-into-Spotlight-419785/

**video**
http://www.youtube.com/watch?v=8AalUg4tHnU
Info Management Operator (IMO)

<table>
<thead>
<tr>
<th>Collection of Data</th>
<th>Local Authority</th>
<th>Processing of Data</th>
<th>Customers of Carrier</th>
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<tbody>
<tr>
<td>Contact Rails</td>
<td>Public Services</td>
<td>Traffic Profile</td>
<td>Local Authorities</td>
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<td>Cameras</td>
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<td>User group Profile</td>
<td>Car Manufacturers</td>
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<td>Constructions</td>
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<td>Services Profile</td>
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<td>Police</td>
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<td>Content / Info</td>
<td>Local services</td>
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<td>Ambulance</td>
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<td>Aggregation &amp; Delivery</td>
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<td>Emergency Calls</td>
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<td>Advanced Route</td>
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<td>Mobile GPS</td>
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<td>TomTom e.a.</td>
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End user
Major network based services/applications to be explored in project

**Entertainment:**
- Music download, Internet radio podcast (scanner according to interests)
- Access to personal media devices via WiFi and direct connect
- On-demand movies (streamed/downloaded from network)
- Game store: download and play
- In-car and out-of-car: Single and Multi-player

**Navigation:**
- Parking Guide
- Traffic info's, Routing, Congestion alert
- Inclusion of traffic sights (congestion based traffic lights)
- Early warning system if vehicles come too close and fast together
- GPS augmented by “Google Maps” type p.o.i. indicators
- Traffic pattern/aerial weather overlays

**Information / Points of Interest:**
- Booking of Flights, Check In, ...
- Location based Advertising, Incentives from gas stations
- Call set up to car if nobody is at home for logistics
- City guide with direct connection to points of interest like event ticketing, exhibitions, theaters, restaurants...
- Voice services
- Network based value added services, e.g., voice recognition
- Wireless internet access via WiFi/LTE

**Car inspection**
- Maintenance tracking and notification
- Virtual mechanic
- Schedule service appointments via Web

Alcatel-Lucent Focus: Infotainment
ALU Positioning Car2X Communications
Back End Enhanced Services for Mobile Wallet

Car2X applications by Alcatel-Lucent:

**Mobile Wallet Service (MWS)** (car2X serv. payment): Payment System for Car2X applications and services

**Digital Media Suite (DMS) / Multimedia Content Manager (MCM)** for Video/music/e-books: Portal and Backend for multimedia content and applications (multiscreen)

**Geographic Messaging and Advertising GMSP/Optism/ADSS**: information services and advertising platform

**Rich Communication Manager (RCM)**: Extension of e-mail into car with voice interface

**Genesys Voice Control**: Voice interface in car

**Motive**: Head Unit Care: Remote access to head unit for updates and maintenance
Alcatel-Lucent Mobile Wallet

Auto Community Card

Peppenhoven OST
Pump 3

Filling up...

Auto Community Card

Peppenhoven OST
Pump 3

Amount: € 60.55
Pay now Visit store

Auto Community Card

Peppenhoven OST
Pump 3

Payment successful
Visit points store Close

Auto Community Card

Peppenhoven OST
Pump 3

Amount: € 60.55
Pay now Visit store
Example Alcatel-Lucent Multimedia Content Manager MCM

One Touch Button to Facebook
Full screen
HD - quality not supported
Rate movie
Add to favorites (not supported)

Share with friends or post on your Facebook or twitter account (name of user is demo.alcatel,lucent.com)
MCM Architecture is Open and Flexible - A Key Requirement for a Platform to Enables a Complete Application Storefront Strategy
Car2X Communications - Alcatel Lucent Open API Service OAS

Developers get APIs for Car2X applications based on ALU GMSP platform for geographic messaging applications
OAS - Connected Car / Car2X

The look & feel of the OBU Menu

Get access over predefined touch bars

Bottom still free for OAS - Geopepper defined as: channel 📍
OAS - Connected Car / Car2X

The embedded link to the OAS - Demo

Simple & fast & easy to use!
Geopepper as channel driven broadcasting portal & WEB2.0 Touch
ANNEX

ALU In Car Applications in more Detail
Mobile payment application
Person to person money transfer

Send money via mobile phone to other people or businesses via
- Mobile application
- Mobile website
- SMS or USSD message
R1.0 limited to mono-operator & mono-country
PC VOD Store Player options

- Full screen
- HD - quality not supported
- Add to favorites (not supported)
- Rate movie
- Share with friends or post on your Facebook or twitter account (name of user is demo.alcatel,lucent.com)
User Case Scenario: Arena/Sports Team

Fans get valuable content at the event

A user signs up for service via:
- Web
- SMS
- WAP
- Cable Portal

The user arrives at/near MSG and gets timed messages throughout the event.

- 8th and 34th Parking Lot is full
- That was Balkman’s 500th point this season
- Buy one Hotdog get one free!
- Get 30% off tickets for tomorrow night’s game