



## Jörg Straube

Alcatel-Lucent

- Jörg Straube ist seit 2008 Senior Solution Architect bei Alcatel-Lucent und in dieser Position verantwortlich für alle technischen Belange während der Presales Phase.
- Vorher war er in diversen Position innerhalb Alcatel-Lucent tätig: Systemdesigner, Leiter R&D Schweiz, Integrationstester für #7-Signalisierung und Instruktor für Ortsvermittlungstellen.
- Mit über 20 Jahren Telekommunikationserfahrung hat sich Jörg Straube ein breites Wissen in diversen Technologien angeeignet. Jörg Straube hat ein abgeschlossenes ETH-Studium in Informatik



Referat Jörg Straube (Alcatel-Lucent): lightRadio

# WELCOME

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## LIGHTRADIO™

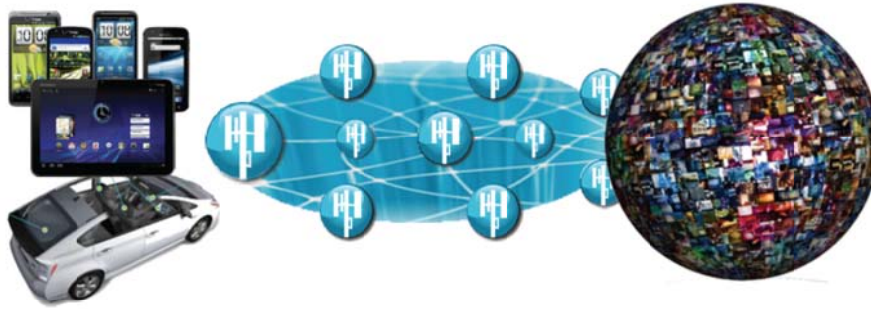
Jörg Straube, Senior Solution Architect  
September 2011

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## THE INDUSTRY HAS MOBILE DATA MOMENTUM



### SMARTPHONE DENSITY

32x increase per km<sup>2</sup> by 2015

### INTERNET OVER MOBILE

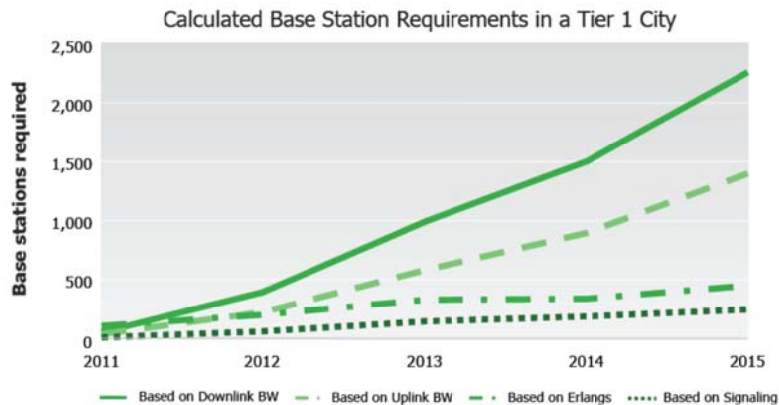
70% of mobile data by 2014

Source: Bell Labs analysis  
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## TRAFFIC GROWTH = BASE STATION GROWTH



More energy, more space, more maintenance

Source: Bell Labs synthesis of real network data with industry growth forecasts  
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**3 TECHNOLOGIES  
5 BANDS  
WHAT'S NEXT?**

City planners resist more antennas



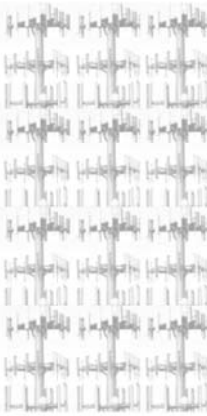


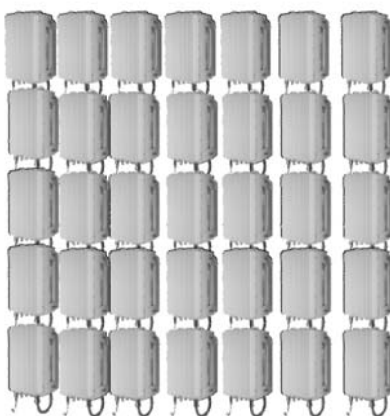
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**BASE STATION DESIGNS WILL NOT SUSTAIN DEMAND**








ANTENNAS AND AMPLIFIERS

Baseband Processing

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**A RADICAL NEW  
APPROACH IS NEEDED**


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**ALCATEL-LUCENT**  
GROUND-BREAKING MOBILE TECHNOLOGY

<p><b>NEW ANTENNA AND RF ASSETS</b></p> 	<p><b>NEW BASEBAND PROCESSING ASSETS</b></p> 
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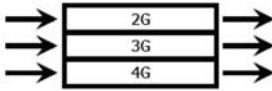
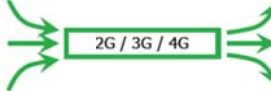
**LIGHTRADIO** simpler, lighter... enabling cloud-like networks


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## WHY IS LIGHTRADIO™ DIFFERENT?


Design	<p>Today's RAN</p> <p>Monolithic boxes and boards</p> 	<p>LIGHTRADIO</p> <p>Dynamic components distributed in the network</p> 
Versatility	<p>One for One</p> 	<p>Three in One</p> 
Deployment	<p>Conventional</p>	<p>Conventional or Cloud</p>

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## THE FUTURE – MAKING ANTENNAS "INVISIBLE"







On a façade




On a pole



On a lamppost



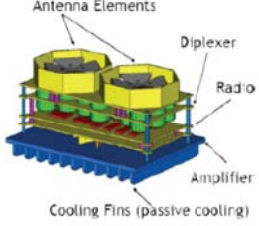
In a bus stop


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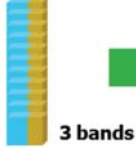
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## WIDEBAND ACTIVE ARRAY ANTENNA CREATING "INVISIBLE" ANTENNAS










**3 bands**





**Radome**






**SNAP**  
Smart Network Antenna Panel

- Multiband/technology
  - Converged RAN compatible
  - Per band power management
  - Reduces # of antennas required/site
- Reduced Site Costs, Better Coverage

- Higher reliability
  - Loss of single element does not impact entire band (FRU)
- Beam forming
  - Reduces interference
  - Puts power where it's needed

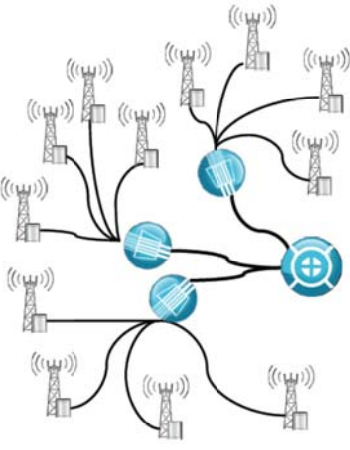
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## RADICALLY CHANGING NETWORK DESIGN

Today




Tomorrow



**HetNet with lighter sites**

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## HETNET APPROACH SMALL CELL WORDING

based on  
RNC/BSC

**Macro**



based on  
GW

**Small cells**

←

←


→

→

		Metro			Femto
		Outdoor Metro	Indoor Metro	Enterprise Femto	Femto
Urban	Rural	High-Density	Business	Residential	
>6W	<4 W	250 mW	100 mW	20 mW	
100+	16-64	16-32	8-16	4	

**SmallCells**

- more than „Femto“
- part of **LIGHTRADIO**






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## 9360 SMALL CELL FAMILY

### EVOLVE TOWARDS TRIPLE W-CDMA/LTE/Wi-Fi MODE

**LIGHTRADIO**


<p>4/8 simultaneous users 20mW HSPA+</p> <p><b>Home</b></p> 	<p>16/24 simultaneous users 100m-250mW Rx Div HSPA+ PoE/DC LTE WiFi</p> <p><b>Office</b></p> 	<p>16/32 simultaneous users 250mW Rx Div HSPA active + PoE/DC HSPA+ LTE WiFi</p> <p><b>Urban</b></p> 	<p>32/64 simultaneous users 2x250mW/ 1W MIMO Rx Div HSPA+ Rel 8 PoE/DC/AC LTE WiFi Backhaul diversity</p> <p><b>Rural</b></p> 	<p>Urban / Rural FDD LTE 8x8 (cube-based) 8x100mW MIMO 150 DL / 70 UL Mbps peak at 20Mhz All-in-one operation compatible with many backhaul options</p> <p><b>SNAP Metro Cell</b></p> 
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## SMALL CELLS POSSIBLE USES CASES

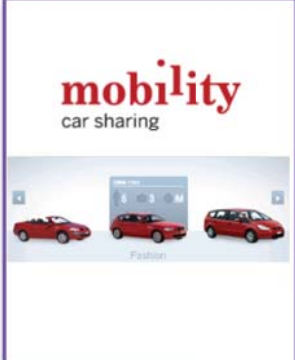


Ebersecken

1 km



MINERGIE®



mobility  
car sharing


**Coverage  
for villages**

**Coverage in  
energy efficient  
homes**

**Coverage in  
underground  
parkings**

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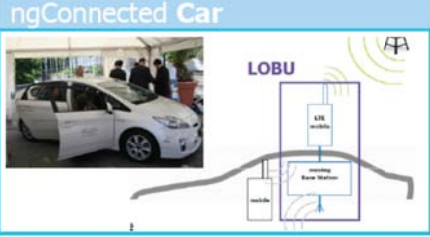
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## SMALL CELLS LTE AS ENABLER

ngConnected Car




ngConnected Boat



Live HD video


ngConnected Plane



40 km cell radius

terrestrial LTE backhaul


ngConnected Train



3G small cell per coach with LTE backhaul

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