

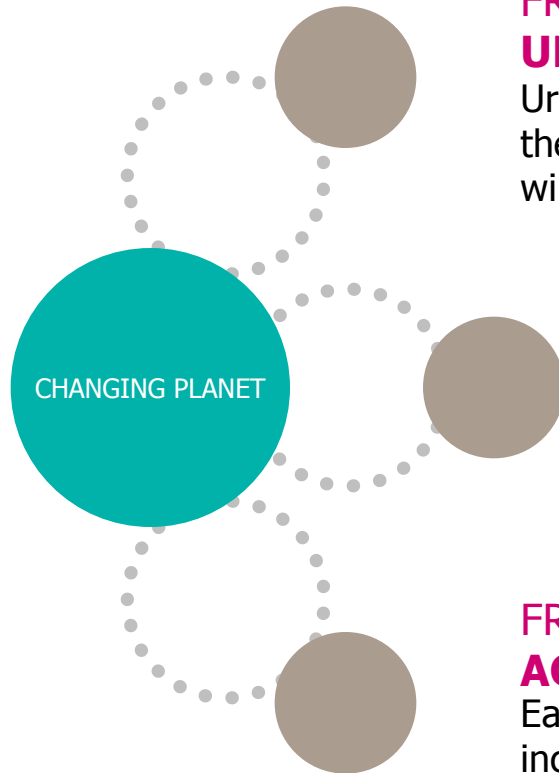


ICT infrastructure as key enabler of Smart Cities

Thierry Van Landegem
Alcatel-Lucent, Bell Labs
FIA Aalborg May 2012

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THE WORLD IS CHANGING



FROM RURAL TO **URBAN GROWTH**

Urban populations will grow by an estimated 2.3 billion over the next 40 years, and as much as 70% of the world's population will live in cities by 2050

FROM PLANET IN BALANCE TO **GLOBAL WARMING/POPULATION EXPLOSION**

Cities consume 75% of the world's energy and produce 80% of its greenhouse gas emissions

FROM YOUTHFUL POPULATION TO **AGING POPULATION**

Each year, the percentage of people over the age of 60 increases—by 2050 the number of people over the age of 60 is expected to triple and will outnumber children under 15 for the first time in human history

MAKING SMARTER CITIES A NECESSITY

SMART CITIES ARE DRIVEN BY INNOVATION...



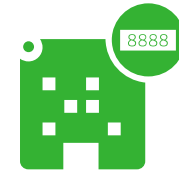
SMART GOVERNANCE

- Democratic processes and inclusion
- Interconnecting governmental organizations and administrations
- Improving community access to services



SMART PEOPLE

- Delivering a more consistent educational experience in both urban and rural areas
- e-education solutions (remote learning and collaboration) to have citizens better informed



SMART ENVIRONMENT

- Environmental sustainability/energy consumption
- Reducing energy consumption through novel technology innovations while promoting energy conservation and material re-use



SMART MOBILITY

- More efficient and intelligent transportation systems
- Leveraging networks for efficient movement of vehicles, people, and goods, to reduce gridlock
- New 'social' attitudes such as car sharing, car pooling, and car-bike combinations



SMART ECONOMY

- Regional/global competitiveness
- Broadband access for all citizens and businesses for business opportunities
- Independent of location, helping maintain population in rural areas,
- Electronic means in business processes of all kinds (e.g., e-banking, e-shopping, e-auction)



SMART LIVING

- Access to high-quality healthcare services (including e-health or remote healthcare monitoring),
- electronic health records management,
- Home automation, smart home and smart building services
- Access to social services of all kinds.

...WHICH ENHANCES THE URBAN LIFESTYLE

PUBLIC/PRIVATE
PARTNERSHIPS



SMART
CITIES



OPEN
BROADBAND
NETWORKS



TO ENRICH DAILY LIFE

.....
AT THE SPEED OF IDEAS™

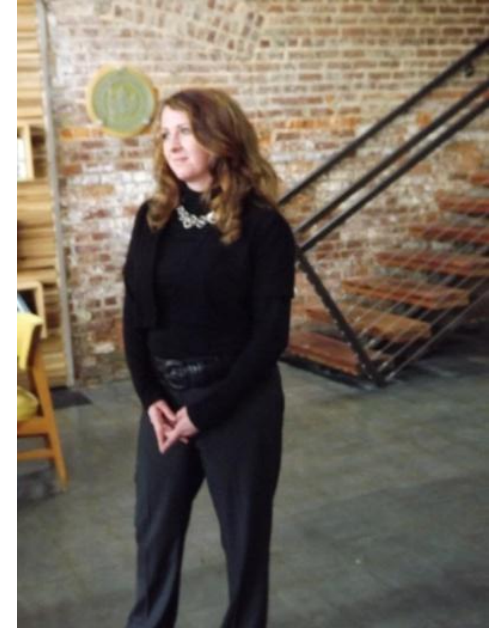
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VOICE OF THE CITIZEN

Primary Market Research by Market & Consumer Insight

- Citizens shared some unique ideas....
 - Service provider who partners with device manufacturers to **turn homes “green”**
 - **Mobile alerts** to survive disasters enabled by data intensive computational modelling & plume analysis
 - **Life changing virtual experiences** - travel, education, comm, entertainment
 - **Positive impacts** on rural areas, underprivileged population



VOICE OF THE CITIZEN

Primary Market Research by Market & Consumer Insight

- Other tangible smart city “effects”
 - Economic development & revitalization to businesses in the city
 - Spurs relocation and infuses new skills
 - Creates city identity which unleashes new social energy and excitement
 - Delivers cost economies to ailing city budgets
 - Builds new “trusted” relationships across public-private sectors



Successful Smart Cities have effective trans-sector leadership
that reaches out to the citizens

MORE INSIGHTS FROM CITIZENS

- Limited awareness of smart city initiatives
 - ✓ Demands continued communication which speaks to the value or impact on quality of life rather than technology of the solutions deployed
- Challenges such as privacy, security, personal identity are not insurmountable
 - ✓ Quality of life benefits and clear communication can overcome fears
 - ✓ Recognition of the trade-offs
- Don't wait for crisis to drive collaboration
 - ✓ Initiate "intentional conversations" with citizens from all segments of the population
 - ✓ Simple, centralized city portals for one-stop shop



ALCATEL-LUCENT VISION FOR SMART CITIES



- Enrich life with more intelligent connections among devices and people
- With an unlimited, ubiquitous and connected universe in which humans, machines and applications interact
- And where community value and financial gain have equal priorities through a fair pricing for all services making it affordable for all the community segments

“Improving quality of life in the cities by catalyzing economic and social development through automated information flows between humans, infrastructure and machines”

SOME HIGHLIGHTS OF WHAT WE HAVE TODAY

EU RESEARCH



SMART SANTANDER

<http://www.smartsantander.eu/>

➡ 2nd FIA Award
Budapest – May 2011



<http://www.fi-ppp.eu/>

OUTSMART

<http://www.fi-ppp-outsmart.eu>

➡ AROPIA – Smart Aarhus
EXPO on 11.04.12
gathering 30 cases of
Smart City solutions and
attracting 500+ visitors



<http://www.fi-ppp-finseny.eu>

➡ FINSNEY White Paper on
Vision, Mission and Strategy
released on 24.04.12

SOME HIGHLIGHTS OF WHAT WE HAVE TODAY

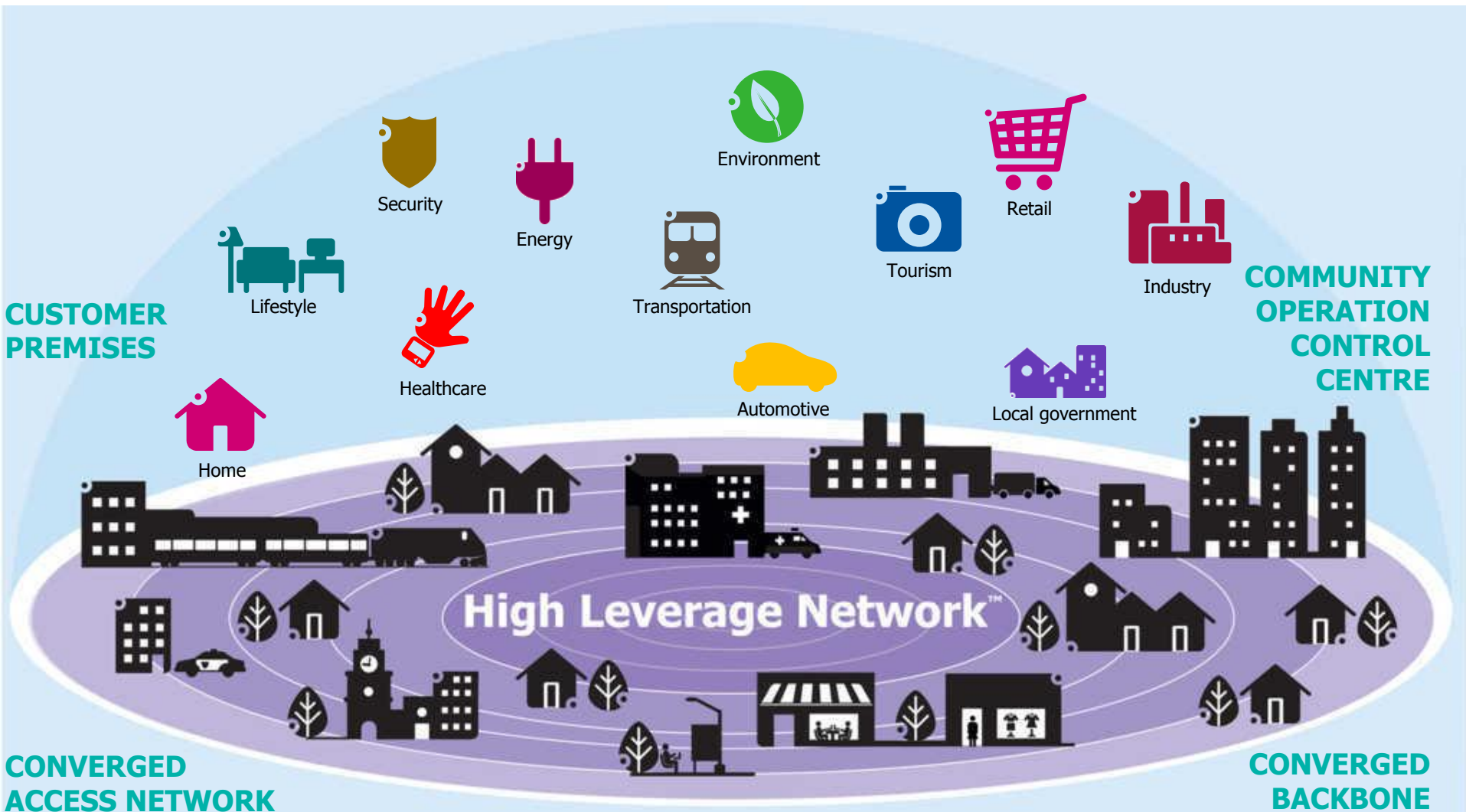
CHATTANNOOGA SMART CITY ESSENTIAL



- Fastest broadband in the USA, 1 Gig into every premise, built by Alcatel-Lucent on behalf of the Electricity Power Board of Chattanooga which is a public body
- Put in place the world's largest Smart Grid system that is already yielding results in terms of power savings and redundancy
- Received more than \$4B in foreign investments into its region
- Attracted major companies like Volkswagen and Amazon
- Active in the development of Smart City services via community-supported initiatives such as the Gig prize

Successful Smart Cities have effective trans-sector leadership

HOW TECHNOLOGY CAN HELP: A SUSTAINABLE NETWORKED PLATFORM



EMPOWERING A SMARTER, SUSTAINABLE WORLD

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A SUSTAINABLE PLATFORM EMPOWERING A SMARTER CITY

Connectivity – a high leverage network that interconnects citizens, government, business and objects

Smart – capabilities in the network that allow better management and control to offer richer application experiences

Secure, private and resilient – a network with the stability, resiliency, and security profile of telecommunications networks

Energy Efficient – a network that is much more efficient and less costly to operate with less power

A SUSTAINABLE PLATFORM EMPOWERING A SMARTER CITY



Smart Citizen

**Smart City
Experience Creation and Enablement**

**Analysis,
Decision Making and Learning**

Automated Control



**Any service,
anywhere on
any device
with QoE**

**Experience
Personalization
& Optimization**

**Always-on IP
connectivity**

A SUSTAINABLE PLATFORM EMPOWERING A SMARTER CITY



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HLN™ Infrastructure
(of highly connected small
nodes/cells)

lightRadio™

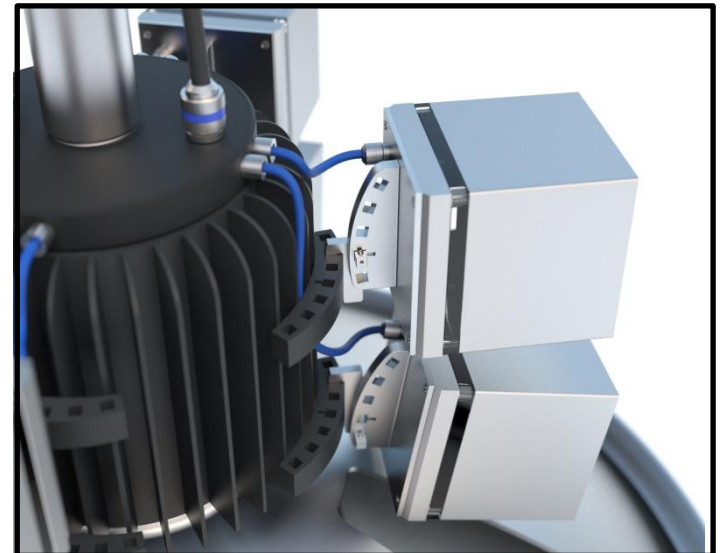


**Always-on IP
connectivity**

lightRadio™ IN A SMART CITY



Source:
Anne-Sofie Voss, Troels Rask Pedersen and Anders Backe
Final thesis Industrial Design
Dept. of Architecture, Design and Media Technology
Aalborg University
Title Mobile antennas
Theme Implementation of technologies in public space
Supervisor
Kaare Eriksen, Associate Professor
Dept. of Architecture, Design and Media Technology
Thomas Arvid Jaeger Associate Professor
Dept. of Architecture, Design and Media Technology
Technical supervisor
Troels B. Sørensen Associate Professor
Dept. of Electronic Systems



A SUSTAINABLE PLATFORM EMPOWERING A SMARTER CITY

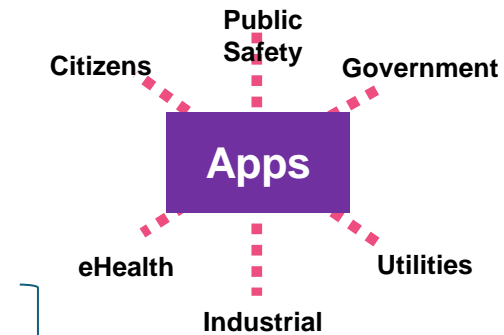


Smart Citizen

Smart City
Experience Creation and Enablement

Analysis,
Decision Making and Learning

Automated Control



**Experience
Personalization
& Optimization**

Value

↑

Analytics

+

Comms

+

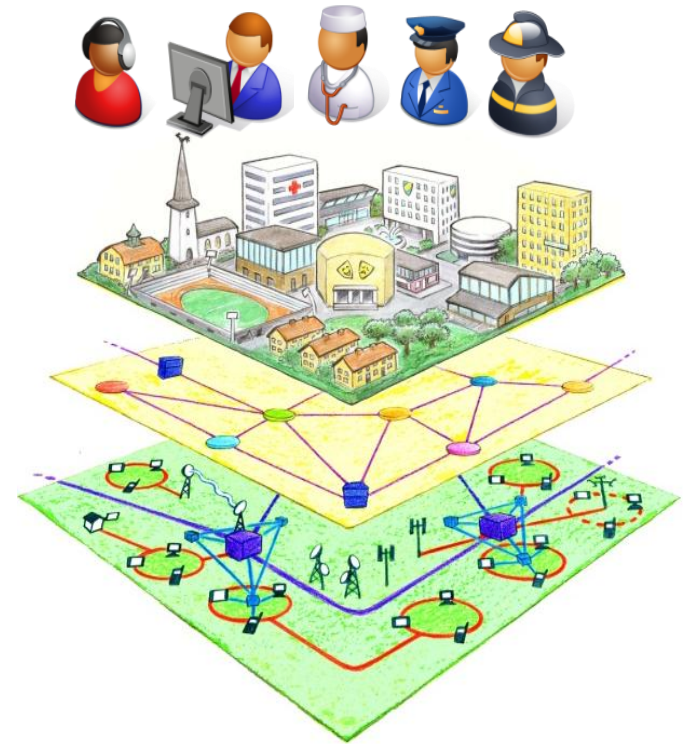
Control

+

Data

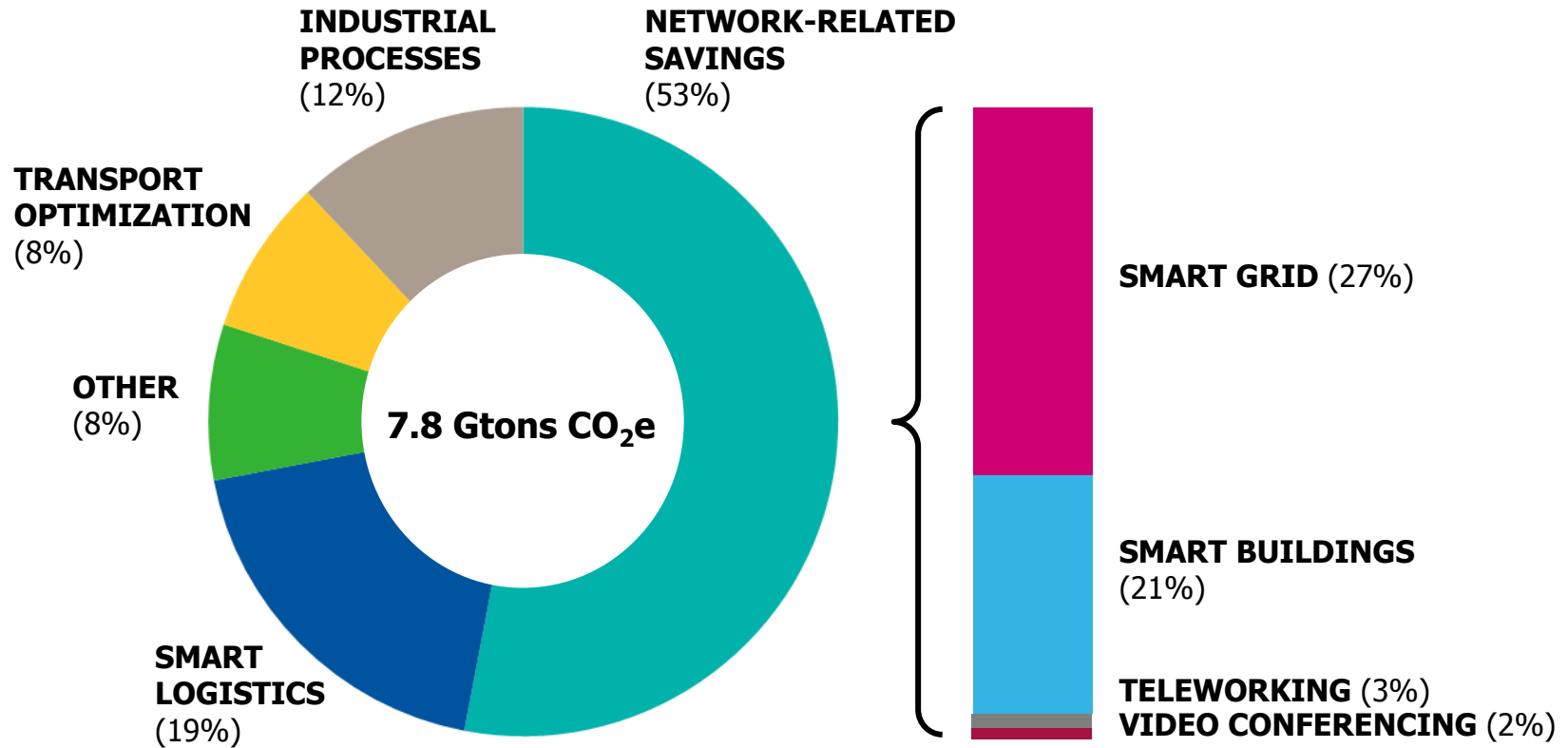
LOTS OF RESEARCH STILL NEEDED ... TO MAKE SMART CITIES SUCCESSFUL

- M2M, internet of things
- Data analytics
- City Cloud solution
- Secure data-centric information management and control
- Privacy concern / "Big Brother City"
- Video surveillance / Image processing / gesture recognition
- Personalization towards the individual
- Develop new economic models
- Eco-sustainability



THE ENVIRONMENT:

SMART CITIES AND SUSTAINABILITY



Source: Alcatel-Lucent analysis of GeSI SMART 2020 data.

SUSTAINABILITY THROUGH GREEN IT

ADVANCED EQUIPMENT FEATURES

KEY BENEFITS

More Integration & Intelligence
using less Energy

OPTIMIZED SITE ENGINEERING

Less Power Wasted
(thermal management, interfaces, etc.)
Alternative Energy Production & Storage

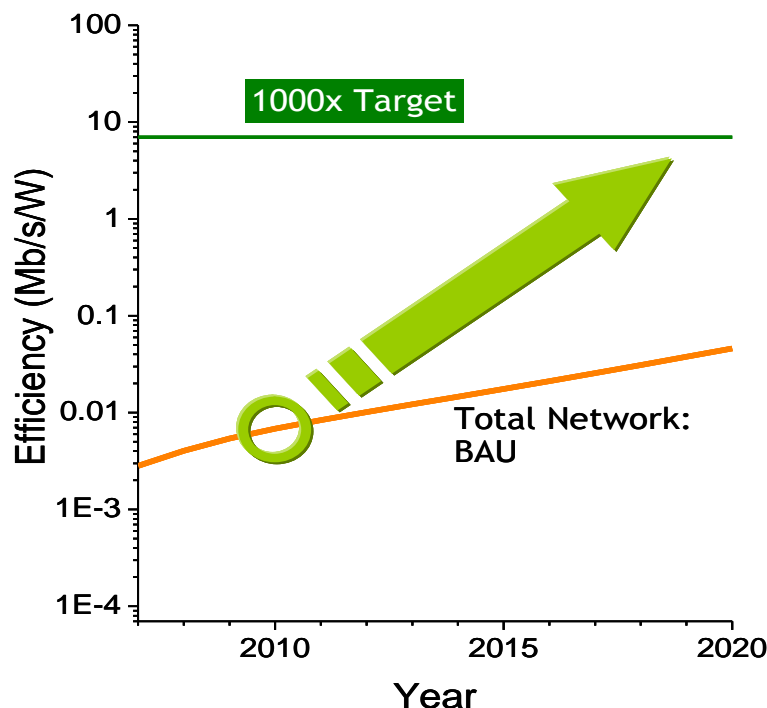
NETWORK ARCHITECTURE & ENGINEERING

More Capability
using Less Equipment

DEDICATED SERVICES

Energy Efficiency Assessment, Network
Transformation, etc.

By 2015, the GreenTouch goal is to deliver the architecture, specifications and roadmap — and demonstrate key components and technologies —needed to increase network energy efficiency by a factor of 1000 from current levels.

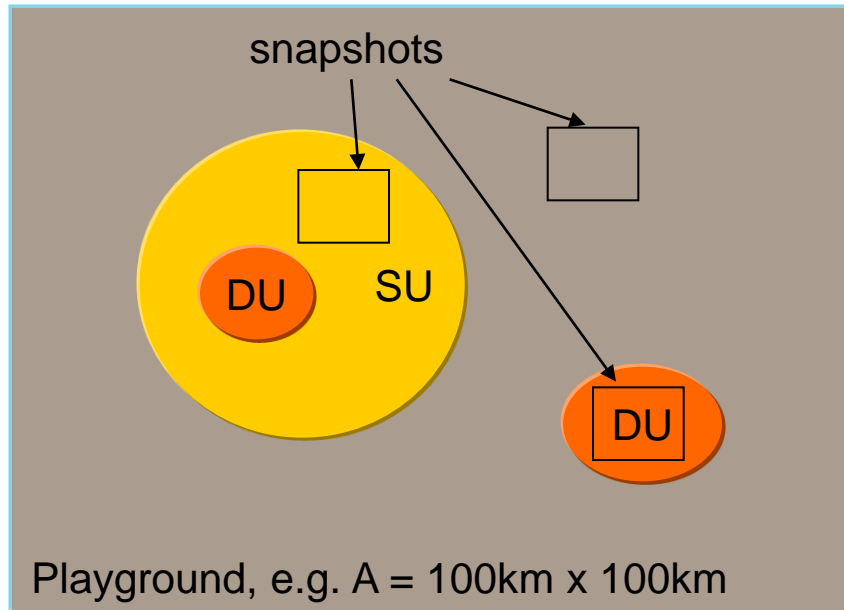


- **Global** research consortium representing industry, government and academic organizations
- Launched in May 2010
- **50+ member** organizations
- 300 individual participants from 19 countries
- **25+ projects** across wireless, wireline, routing, networking and optical transmission

- GreenTouch uses **roadmaps** to bring focus to key challenges in future networks
- Smart cities are a **cutting edge network scenario** with demanding requirements most likely to benefit from GT innovations
- **City planning is a long term activity**, so by placing smart cities on the roadmap, GT can provide guidance at earliest possible stage

GREENTOUCH AND SMART CITIES

LARGE SCALE MODEL



Overall system is composed of different types of areas

- Dense urban
- Urban
- Suburban
- Rural
- Scarcely populated areas

Parameters for the smart city case

- Reference topologies
- Snapshot models for mobile
- Traffic projections
- Unique service requirements

SMART CITIES

AN OPPORTUNITY FOR EUROPE

ICT is the **central nervous system** of smart cities

Citizens and business are demanding access to services from any location and any time

Position smart cities as a way to **regain leadership in wireless**

Build a platform that **is smart and energy efficient**

Europe to support this in **a grand challenge manner** from research, to pilots and trials, to innovative procurement policies

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THE
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