Seminar – Morning session
Monday June 22, 2015

08:00 - 08:30

Registration and morning tea - networking

08:30 - 10:30

Welcome and introduction
- Arun Bansal, Senior Vice-President & Head of Business Unit Radio, Ericsson
- Ulf Pehrsson, Vice-President Government & Industry Relations, Ericsson

Keynote: Perspectives on Smart Africa and Broadband for all
- Minister Jean P Nsengimana, Ministry of Youth & ICT, Rwanda

Keynote: Policy perspectives on ICT in Colombia
- Diego Molano, Advisor to the President, Colombia Government, Colombia

Keynote: Technologies for the Networked Society
- Ulf Ewaldsson, Group CTO, Ericsson

10:30 - 11:00

Coffee break - networking

11:00 - 12:00

Panel debate: Why and how to master an ICT-enabled digital transformation of our society?

Chair: René Summer, Director Government & Industry Relations, Ericsson
- Nagy Hanna, S Fellow, Center for Policy on Emerging Technologies, United States
- Fernando Borjon, Commissioner, IFT, Mexico
- Corinne Charette, Senior Assistant Deputy Minister, IC, Canada
- Juan Ketterer, Chief, Capital Markets and Finance Division, IADB , USA
- Richard Bean, Deputy Chairman, ACMA, Australia
- Lena Carlsson, Executive Director, Committee for Digitalization, Sweden

12:00 - 13:30

Lunch - networking

Seminar – Afternoon session
Monday June 22, 2015

13:30 - 15:30	**Broadband for all in Sweden** - Göran Marby, Director-General, PTS, Sweden **Broadband for all in Mexico** - Mónica Aspe Bernal, Under-Secretary of Communications, Secretaría de Comunicaciones y Transportes (SCT), Mexico **Broadband for all in India** - Sudhir Gupta, Secretary, TRAI, India **Broadband for all in Australia** - Richard Bean, Deputy Chairman, ACMA, Australia **Regulatory aspects on autonomous driving** - Ingela Sundin, Head of Section Vehicle Engineering, Swedish Transport Agency, Sweden
15:30 - 16:00	**Coffee break - networking**
16:00 - 17:00	**Panel debate: Will the expected results from WRC-15 be sufficient to meet the traffic expansion of mobile broadband until the introduction of 5G after 2020?** Chair: José Costa, Chairman ITU-R WP 5A, Vice-Chairman ITU-R SG 5 & Director Wireless Access Standards, Ericsson - Philip Marnick, Group Director for spectrum, Ofcom, United Kingdom - Shin-Yi Peng, Commissioner, NCC, Taiwan - Bernard Celli, Director of Strategy, ANFR, France - Thu Nguyen, Deputy Director General of ARFM, MIC, Vietnam - Syed Ismail Shah, Chairman, PTS, Pakistan
17:00	**End of afternoon session**
17:30	**Dinner networking cruise on M/S Blue Charm. Boarding: Strandvägen, Quay 17 at 17:30. Departure 18:00 sharp.**

Technology briefing
Tuesday June 23, 2015

Ericsson

Ericsson Studio
Grönlandsgången 4
Kista, Stockholm

Room:
Forum

09:00 - 12:00

The ICT-transformation of the society is radically changing our world. Wireless communication will be applied to completely new use cases – we will see an increased spread and usage of smartphones, new applications being developed and many billions of devices and sensors will become connected.

This transformation will put new demands on the mobile networks, with requirements varying radically between different use cases but also between different devices. The future mobile networks – 5G systems – need to provide global, wireless, connectivity with superior performance both for communicating people and machines, with capabilities to handle very large data rates and data volumes, while being very reliable to allow for critical industrial and societal applications. The 5G systems also need to accommodate for devices with limited capabilities where device cost, power consumption or coverage (range) are among the key properties.

This briefing will address some of the key ICT trends and technology issues important to the continued deployment of affordable and high-capacity mobile broadband services. The transport & vehicle sectors will be discussed as examples of an ongoing transformation towards a networked society.

08:30 - 09:00	**Registration and morning tea**
09:00 - 09:10	**Welcome and introduction** - Mikael Halén, Director, Government & Industry Relations, Ericsson
09:10 - 10:00	**ICT trends in the transport & vehicle sectors** - Olle Isaksson, Head of Strategy, Industry & Society, Ericsson
10:00 - 10:20	**Coffee break and networking**
10:20 - 11:00	**5G technology research & standardization** - Dr Sara Mazur, VP & Head of Ericsson Research, Ericsson
11:00 - 12:00	**Technology demonstrations** - 5G – Live Test Bed, Excavator, "5G for Sweden" - LTE – LAA, FDD/TDD, LTE-A Evolution - Cloud - In-door solutions - Rural coverage - Mobility Report, Sustainability and Consumer lab
12:00 - 13:00	**Lunch is served in the Ericsson Studio**

PERSPECTIVES ON SMART AFRICA

STOCKHOLM
22 June 2015

Outline

❑ **The Organization**
- ✓ Pillars and Enablers
- ✓ Flagships projects and championship
- ✓ The Governance Structure

❑ **Quick Wins:**
- ✓ One Africa Network
- ✓ Broadband infrastructure provision along other key infrastructure
- ✓ Transform Africa Scholarship Fund
- ✓ Operationalization of the Smart Africa Taskforce

smart rwanda
CONNECT. INNOVATE. TRANSFORM

E-Government
SMART Cities & Communities

H.E. Paul Kagame
President of the Republic of Rwanda

REPUBLIC OF RWANDA

smart uganda
CONNECT. INNOVATE. TRANSFORM

Sustainable Development
Africa Data Revolution

H.E. Yoweri Kaguta Museveni
President of the Republic of Uganda

REPUBLIC OF UGANDA

smart gabon
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Innovation
ICT Industry Development

H.E. Ali Bongo Ondimba
President of the Republic of Gabon

REPUBLIC OF GABON

smart south sudan
CONNECT. INNOVATE. TRANSFORM

Communications and Advocacy
Africa Digital Literacy

H.E. Salva Kiir Mayardit
President of the Republic of South Sudan

REPUBLIC OF SOUTH SUDAN

**Capacity Building
Smart Africa Scholarship Fund**

H.E. Michel Kafando
President of Burkina Faso

BURKINA FASO

**Broadband for All
Smart Africa Green Economy**

H.E. Macky Sall
President of the Republic of Senegal

REPUBLIC OF SENEGAL

smart kenya

CONNECT. INNOVATE. TRANSFORM

**Policy
Digital Economy**

H.E. Uhuru Kenyatta
President of the Republic of Kenya

REPUBLIC OF KENYA

smart mali

CONNECT. INNOVATE. TRANSFORM

**Private Sector / Entrepreneurship
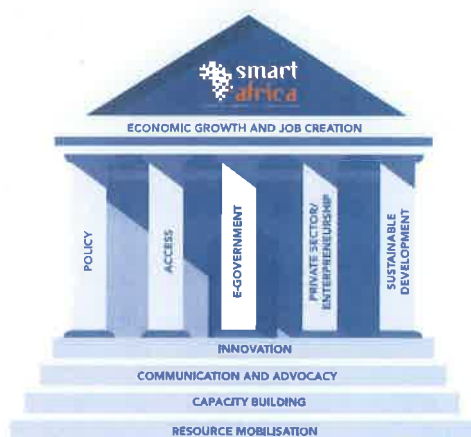Youth Innovation and Job Creation**

H.E. Ibrahim Boubacar Keïta
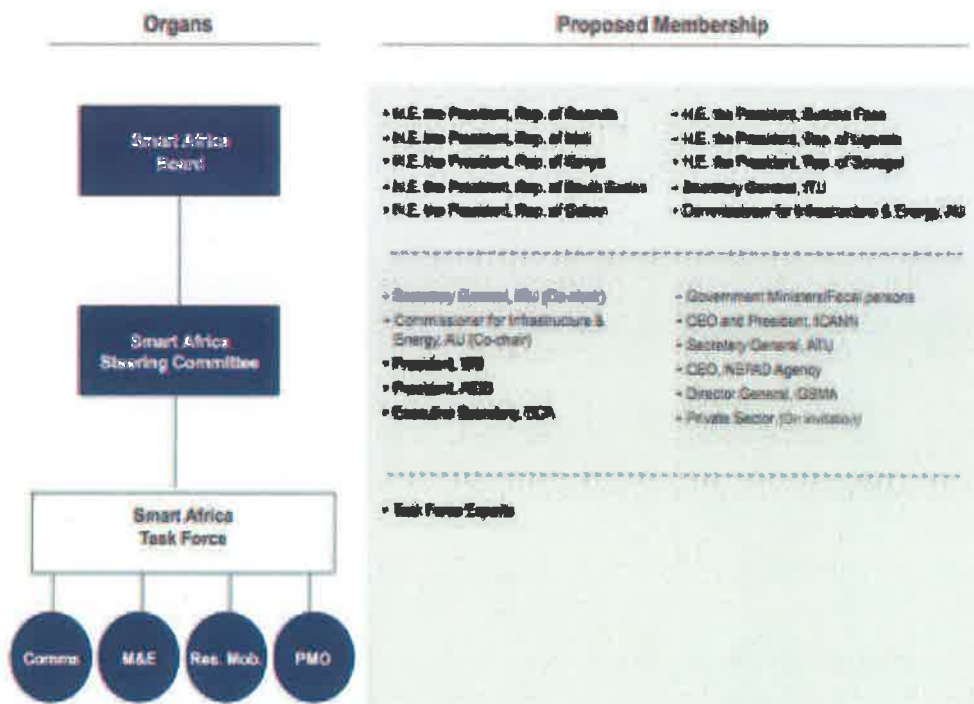President of the Republic of Mali

REPUBLIC OF MALI
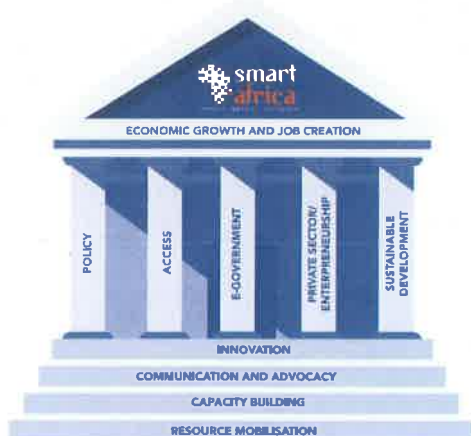
Dr. Elham Mahmoud Ahmed Ibrahim (Mrs)
Commissioner for Infrastructure and Energy

African Union

AFRICAN UNION

SE Houlin Zhao
Secretary-General of the ITU

The Governance Structure

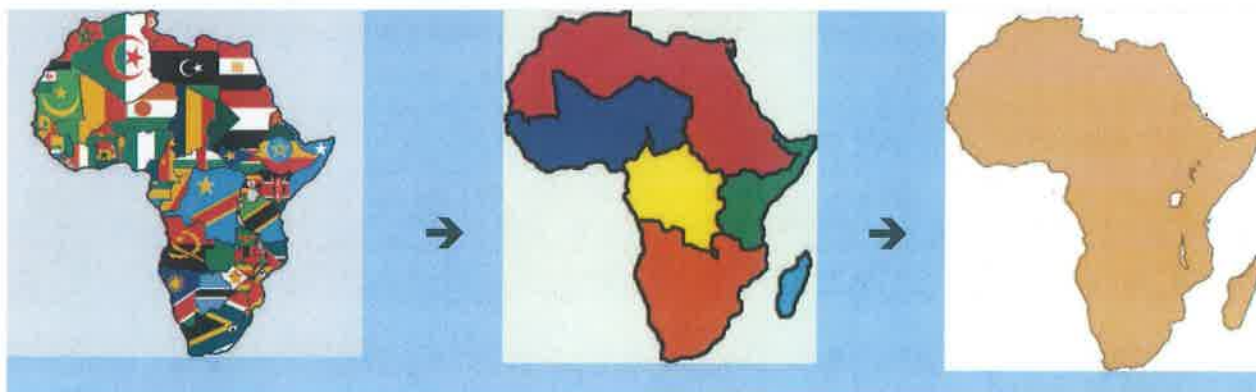| Organs	Proposed Membership

Quick Wins

1. One Africa Network

Quick Wins

2. Broadband infrastructure provision along other key infrastructure

Quick Wins

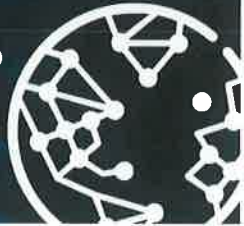**3. Transform Africa Scholarship Fund**

4. Smart Africa Secretariat

Tack så mycket!

THE NETWORK FOR THE
NETWORKED
SOCIETY
AND INDUSTRY
BEYOND SMARTPHONES

ERICSSON

Ulf Ewaldsson
Senior VP & CTO

2020

	2014	2020
› Subscriptions (M)	7,100	9,200
› MBB (M)	2,900	7,700
› Smartphone subs (M)	2,600	6,100
› Mobile Traffic (EB/Month)	3.2	30.5
› Fixed Traffic (EB/Month)	40	140
› Video (% of Mobile Traffic)	45	60
› Pop coverage (%)		
– GSM EDGE	>85	~95
– WCDMA/HSPA	~60	~90
– LTE	~20	>70

>2X

9X

13X

Source: Ericsson Mobility Report
This slide contains forward looking statements

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MOBILE SUBS BY TECHNOLOGY

Mobile subscriptions by technology (billion)

9.2 billion

7.1 billion

3.7 billion LTE subscriptions by the end of 2020

Legend:
- 5G
- LTE/WCDMA/GSM and LTE/CDMA
- WCDMA/GSM
- GSM/EDGE-only
- TD-SCDMA/GSM
- CDMA-only
- Other

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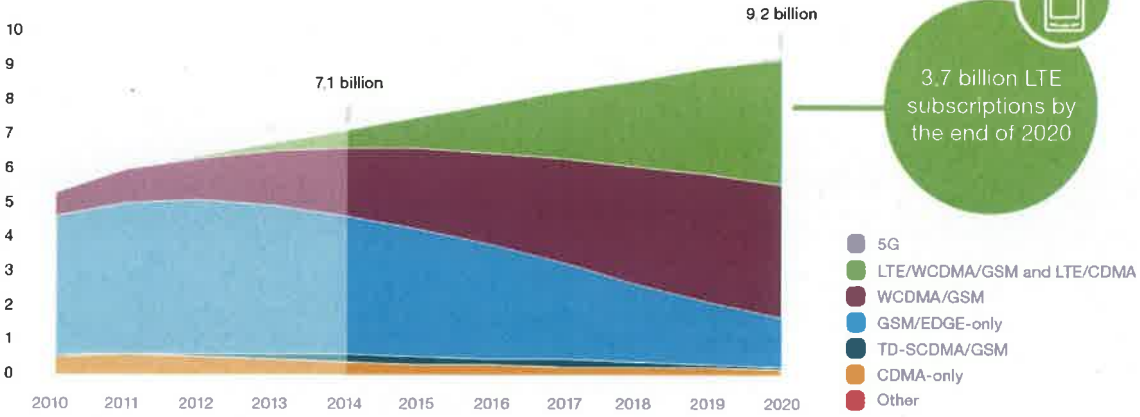
POPULATION COVERAGE

World population coverage by technology[1]

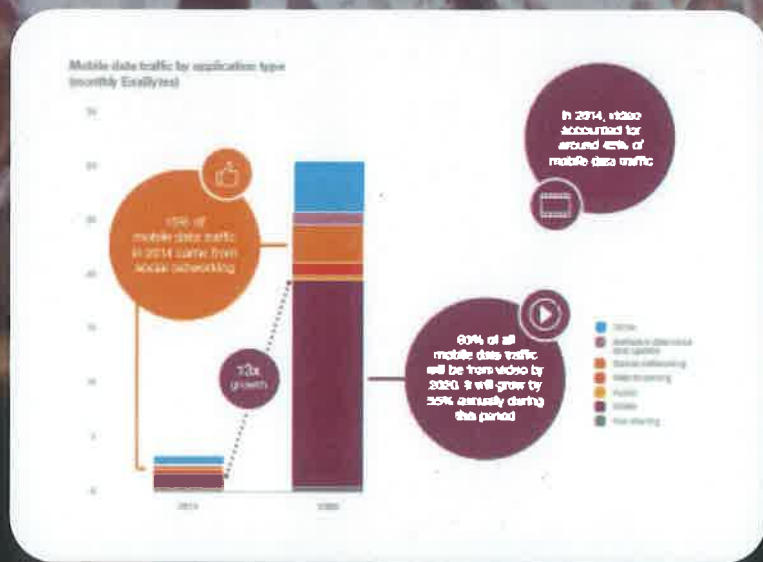**By 2020, around 90 percent of the world's population will be covered by mobile broadband networks**

GSM/EDGE
- 2014 ~90%
- 2020 ~95%

GSM/EDGE will retain the widest global reach

WCDMA/HSPA
- 2014 ~65%
- 2020 ~90%

WCDMA will be driven by increased internet access demand and the growing affordability of smartphones

LTE
- ~40%
- ~70%

LTE uptake is driven by demand for an improved user experience and faster networks

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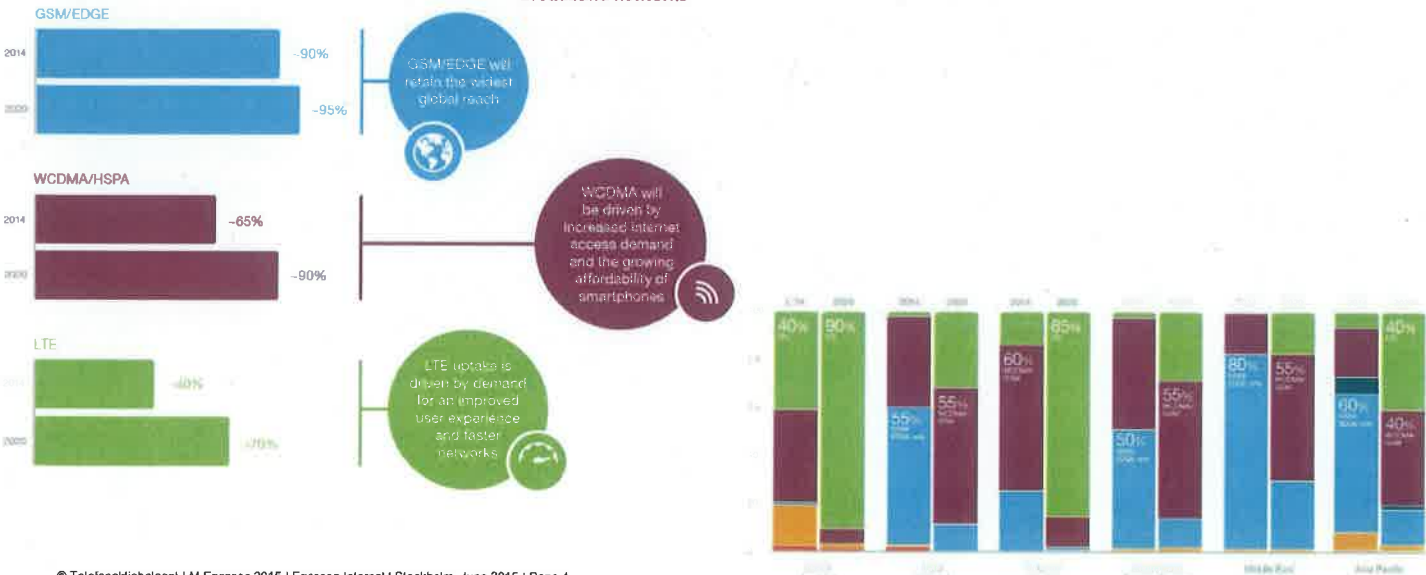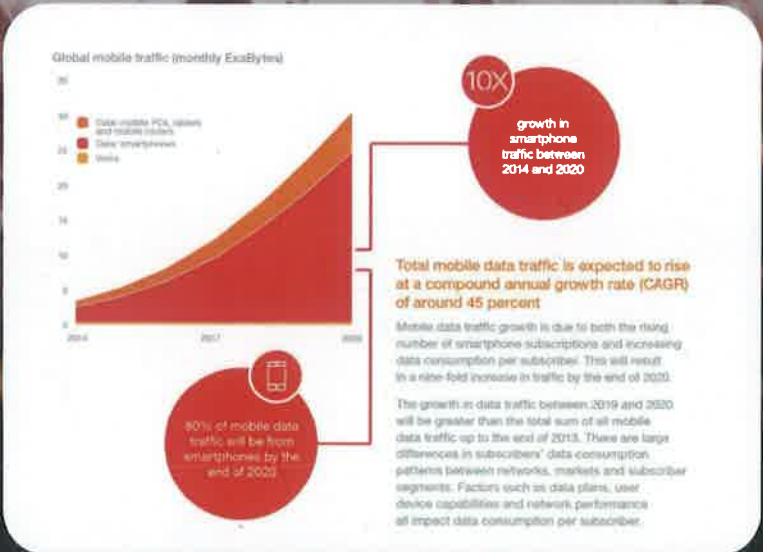
GUIDING TRENDS

Spectrum is the most valuable resource

Throughput to Customer Experience

ICT unlocks value & changes rules of business

Programmable & Automated Horizontal Networks

New Media Services

Integrated Security & Aware Consumers

Telecom, Datacom & Mediacom

NETWORKED SOCIETY
THE 5TH TECHNOLOGY REVOLUTION

INSTALLATION

DEPLOYMENT

MOBILITY

BROADBAND

CLOUD

INDUSTRY TRANSFORMATION

Traditional Industries — Digitalize & Mobilize → Transformed Industries

Operators & Network

Devices — Applications

Users, Content & Devices

OPERATOR EVOLUTION

ARCHITECTURE

Management

Access | Applications

Cloud Infrastructure

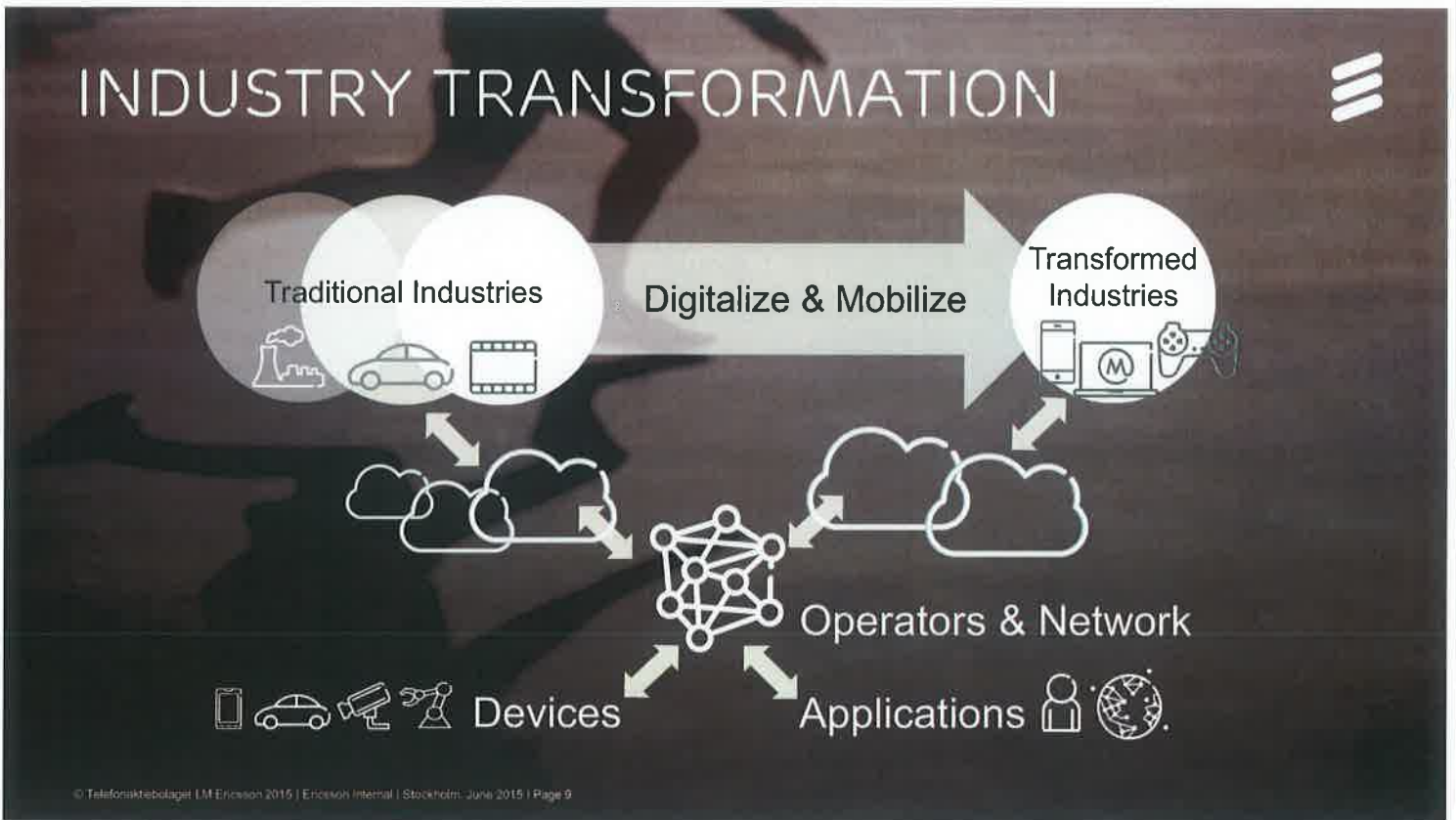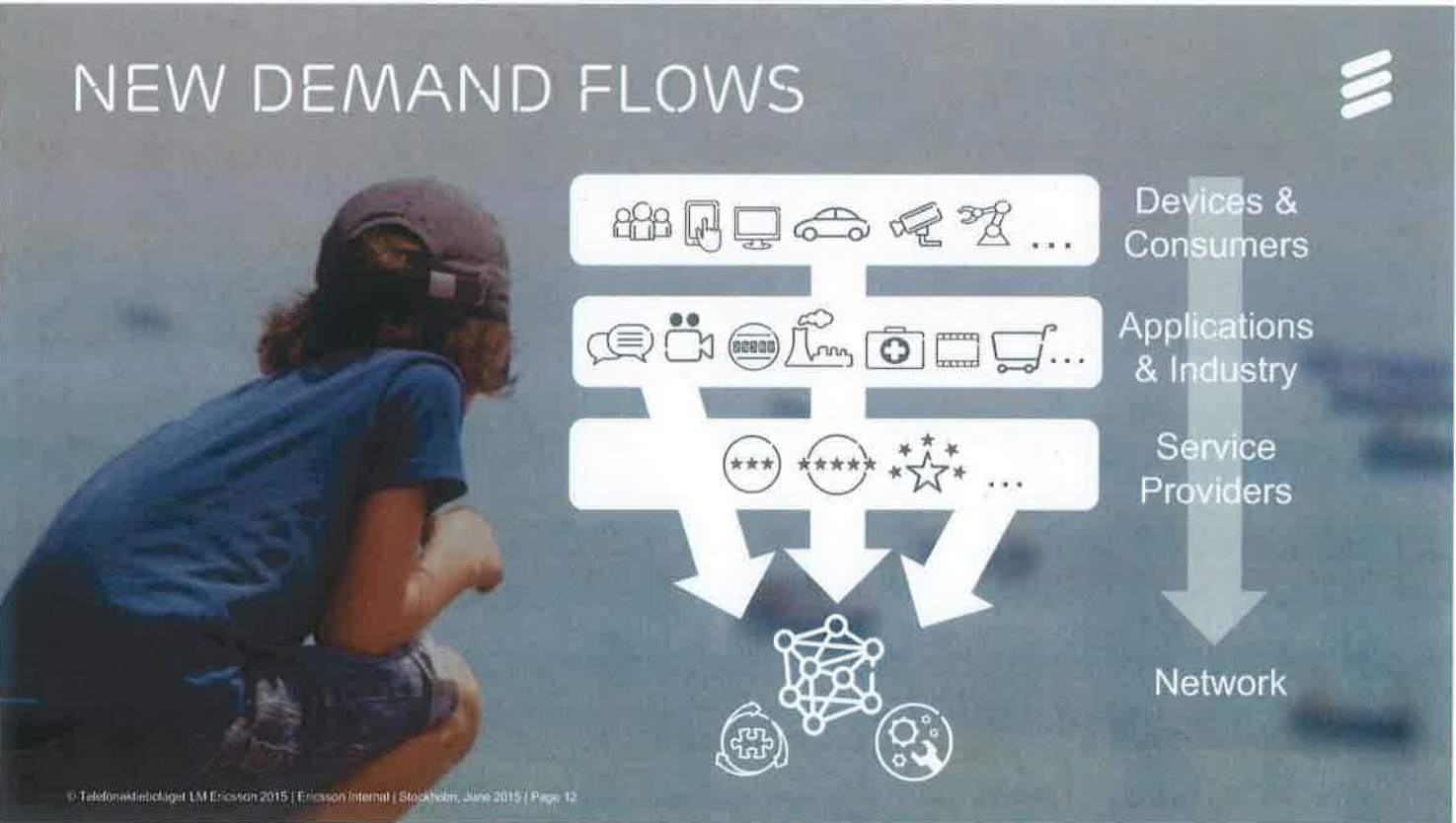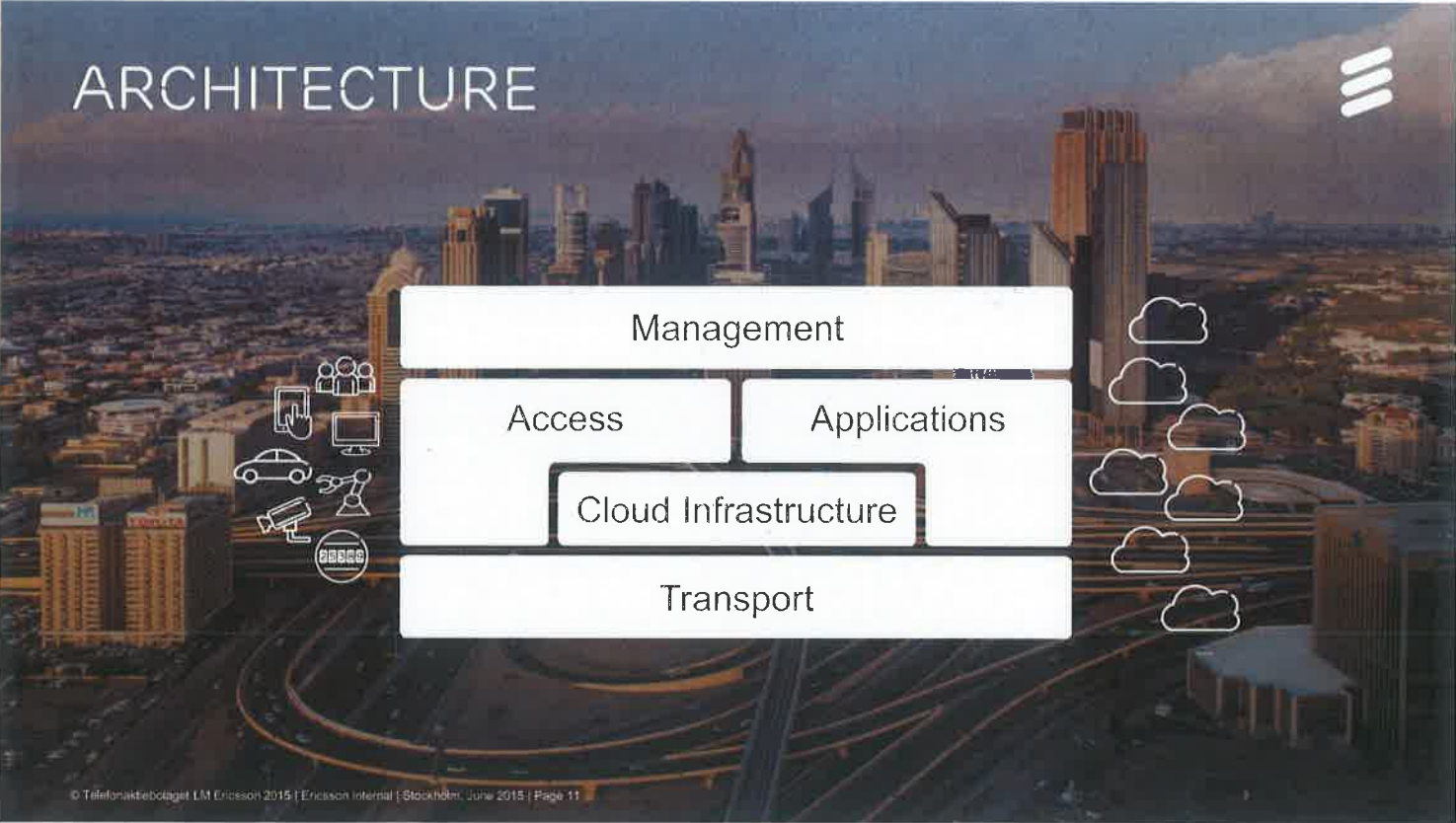Transport

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NEW DEMAND FLOWS

Devices & Consumers

Applications & Industry

Service Providers

Network

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ONE NETWORK - MULTIPLE INDUSTRIES

NETWORK BEYOND 2020
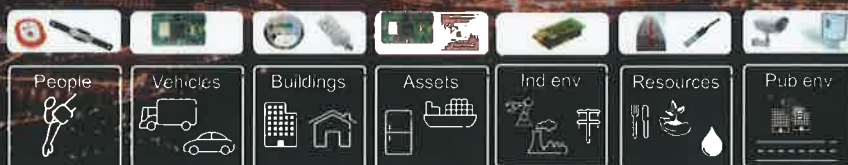
FREQUENCY EVOLUTION
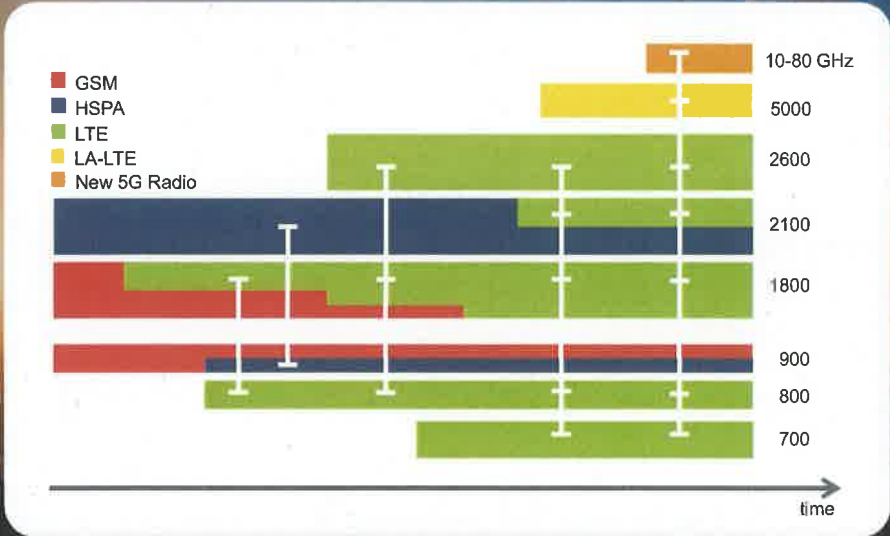
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WE DRIVE A GLOBAL STANDARD

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EVOLUTION TO 5G

Industry Collaboration

Global Activities

Engaging Academia

Accelerated Innovation

2014-15

ITU Vision
3GPP Rel 13
WRC 15
Test Beds
Evolution

2016-18

ITU Requirements
3GPP Rel 14 & 15
5G Req/Tech SI
5G initial WI
Advanced Test Beds
Cont'd Evolution

2019-2020

ITU eval + specs
WRC 19
3GPP Rel 16
Cont'd Evolution

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FAIR USE OF TECHNOLOGY

2G, 3G, 4G
commercialization & scale has worked well

A need for the same in 5G

Incentive to continued investment in future technologies

Creates more value for everyone in the value chain, including the end-user

FRAND

Fosters collaboration in various open ecosystems and sharing technology within our industry

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SECURITY FOCUS AREAS FOR THE ICT INDUSTRY

Keep unwanted traffic at bay

Secure software practices

Building trust in clouds

Security assurance

Secure virtualization

Security for big data

Device and platform security

Identity management

EMERGING THREAT VECTORS

GENERATIONAL SHIFT IN HOW NETWORKS ARE SECURED

Threats / Issues:
- Cloud based telco infrastructure -> increases complexity to secure
- Foreign gov't and industrial espionage
- Local, Regional RAN/Mobile core takeout (DDOS) or takeover

Threats / Issues:
- Mobile & IoT device malware
- IoT device pirating & fraud

Service providers

Infrastructure operators

Enterprise

Devices

Large Enterprise

Small Enterprise
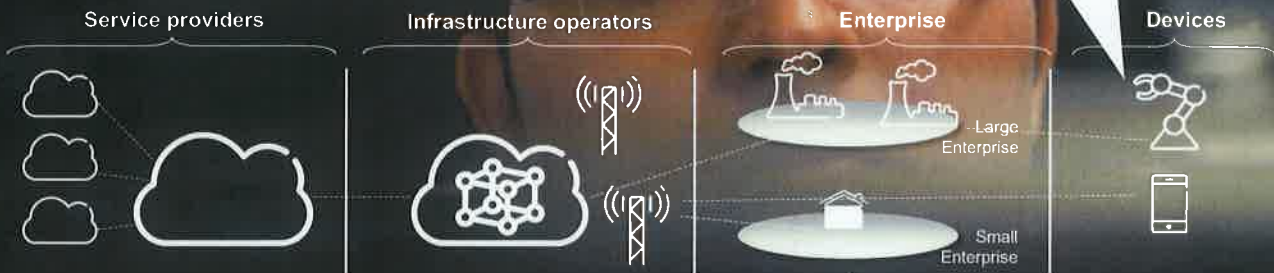
Threats / Issues:
- Advanced malware; crimeware ; spyware

NET NEUTRALITY & TITLE II

Devices
(smartphones,
laptops, PCs, TVs)

Fixed and Mobile
Access providers
(BIAS)

Edge providers
(E.g. CDNs)

Content,
Applications,
Cloud Service
providers

› Regulation of Internet under Title II

- Risk to industry innovation and investments

› Specifically regulating the access

- Covers only access, not other roles (content, peering)

› Limits to differentiation on access priority/performance

- No paid prioritization for Broadband Internet Access Service (BIAS)

- Exception for Specialized Service

ERICSSON'S POSITION

› **Ericsson supports an Open Internet**
- An *Open Internet* where consumers can reach any lawful Internet service they want;
- Flexibility for network owners to experiment with offerings that respond to customer needs;
- Freedom for network owners manage the network to the benefit of all users; and
- The ability of network owners to take steps to protect the network from harm or misuse.

› **An Open Internet is more than best effort Internet**
- Support managed services such as VoIP and IPTV;
- Offer highly valued customer services like zero-rated or subsidized data; and
- Be capable of delivering guaranteed quality of service to sectors like health, public safety, utilities, and enterprise.

› **Transparency is important**
- ISPs should offer transparent and fair terms to their customers
- Content providers should offer transparent and fair terms to their customers

A NEW AGE

Expanded Community

Industry Partners
Users
Academia

M2M, OMA, IPSO, IIC
3GPP, IETF
ETSI/NFV, Openstack

Standards, Alliances, Open Source

Accelerated Innovation

Programmability
Automation & Analytics
Open Data & Exposure

Security & Privacy

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THE NETWORKED SOCIETY LOGIC

Music ➡ Culture

Retail ➡ Exchange

HEALTHCARE ➡ WELLNESS

EDUCATION ➡ LEARNING

TRANSPORT ➡ MOBILITY

Utility ➡ Function

Banking ➡ Transaction

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IMPACT AND OFFSET

IMPACT ON
98%

2%
CONTRIBUTION

SMARTER
USE OF ICT

= -16.5%
GLOBAL CO_2
EMISSIONS

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ERICSSON

Broadband for all – the Swedish experience

Göran Marby
Director-General Swedish Post and Telecom Authority

PTS   Swedish Post and Telecom Authority

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a regulators job is to give the user choice

PTS

Consumers demand ...
Speed
Access everywhere on every device
Mobility
Quality/capacity

... to get

All content available through the Internet

PTS
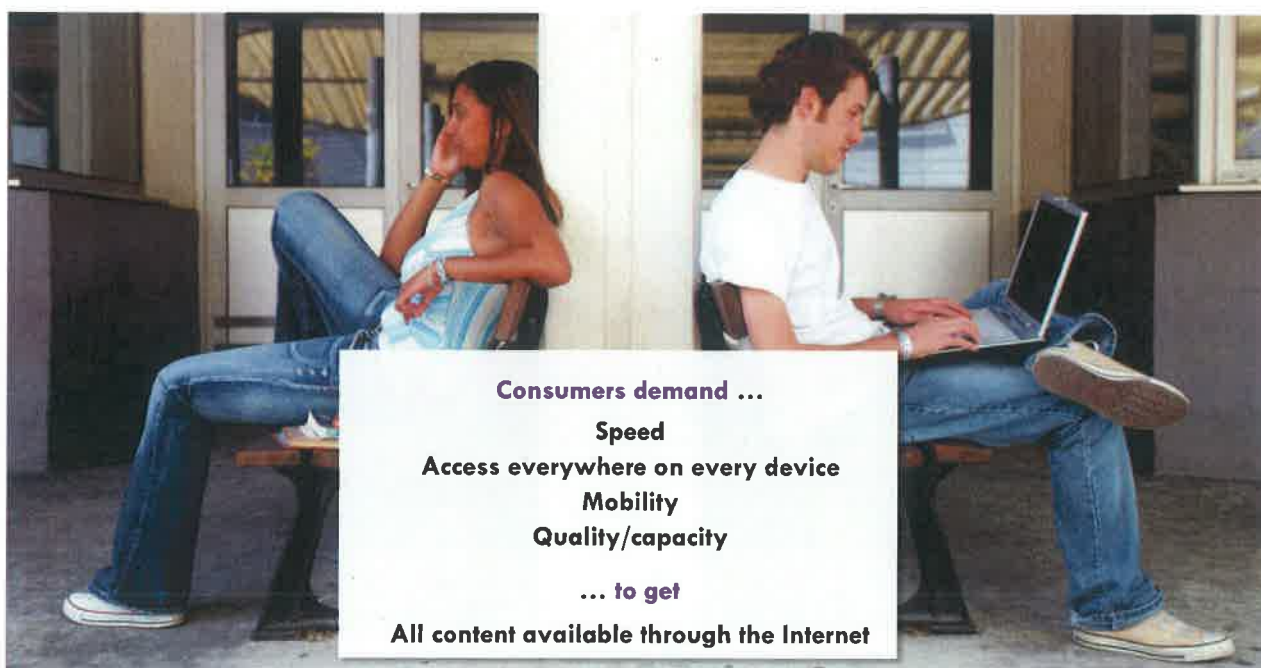
Broadband in Sweden – highlights 2014

- More subscriptions on fibre and fibre Lan than on xDSL. Fibre the most common access technology for fixed broadband in Sweden.

- Over 1 million broadband subscriptions with 100 Mbit/s or over download.

- Continued strong growth in 4G subscriptions and in mobile data traffic

- TV services subscriptions decreases, but IPTV continues to increase and is now the largest digital platform

- Subscriptions on fixed telephony decreased, IP telephony now 46%

PTS

4G subscriptions continue to grow
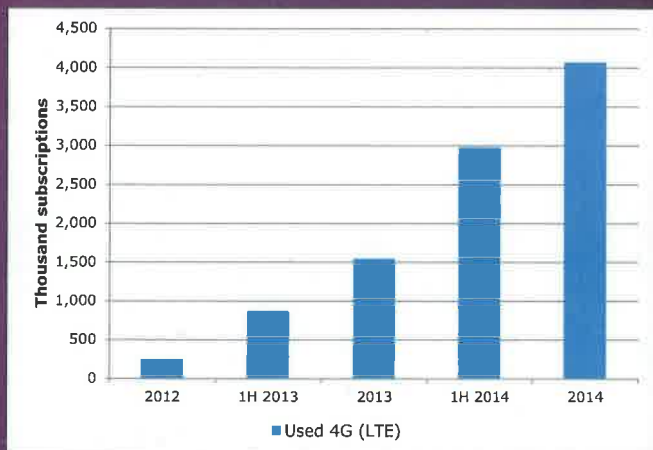
- 4.1 million have used 4G, +2.5 million subscriptions
- 20 % of all mobile subscriptions have used 4G

PTS

Fibre (LAN) surpassed xDSL as the most common form of fixed access
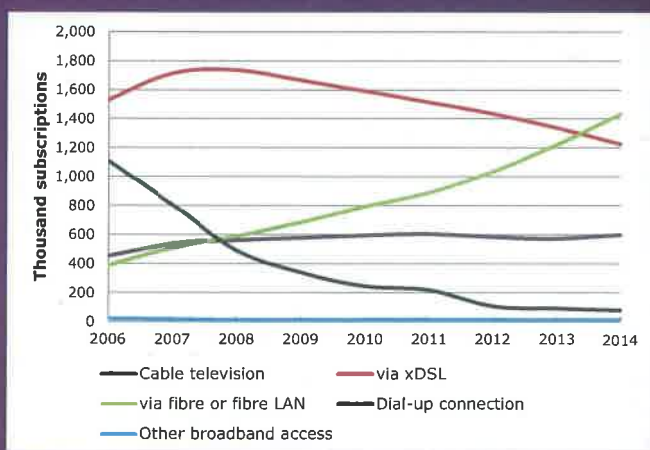
Fixed broadband 3.3 million +4%

- Fibre and fibre-LAN: 1.4 million 17%
- xDSL: 1.2 million -8%
- Cable TV: 601,000 +5%

PTS

Over 1 million fixed subscriptions with 100 Mbit/s download
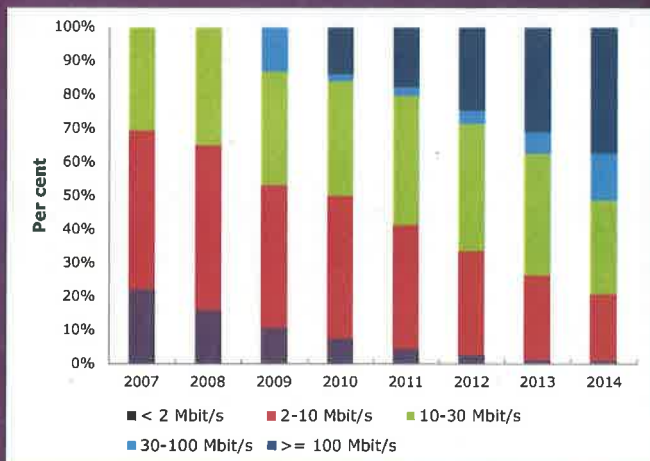
100 Mbit/s and over:

1.2 million +25%

- Fibre and fibre-LAN 975,000 +21%

- Cable TV 245,000 +44%

PTS

Boost in subscriptions with high upload speeds
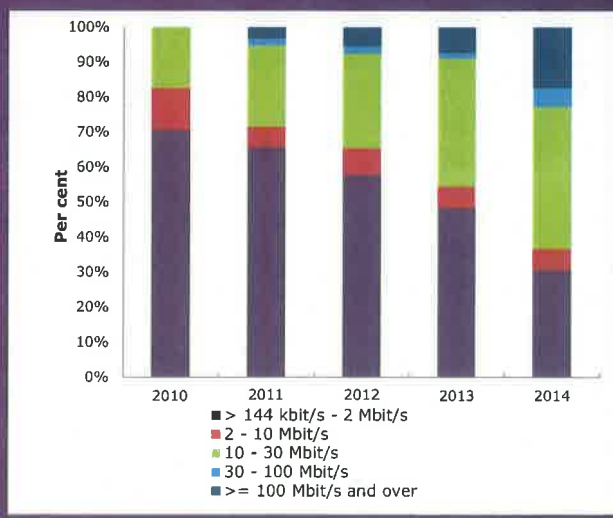
- 100 Mbit/s and over: 573,000 +166%

- 30 - 100Mbit/s: 174,000 + 275 %

PTS

Ongoing technological and market developments

- We are moving from specific networks for specific services to ip-based networks for all services

- The provider of the network infrastructure does not have a monopoly of providing services anymore!

PSTN/GSM-networks for voice

Television networks for TV

Terrestrial audio broadcasting networks

Computer networks for data

One IP-network can transport all services
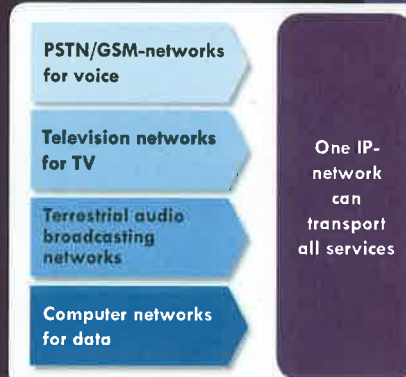
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Mobile needs fibre

Mobile access

Wifi

Fixed access

PTS

The Swedish regulatory story – re-regulation, not de-regulation

- In the beginning there were national telecom monopolies

- Removal of national monopolies to create better services and innovation for end-users

- Regulation is necessary to achieve a market with transparent and stable rules enabling a level playing field with competition

- On a well-functioning market the price is right for both buyers and sellers

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Development of regulation in Sweden

90's: Prefix, carrier selection, LLU, inter-connection

2008: 13 markets – many competitors

2003: 20 markets regulated – many processes

2010: 8 markets, fibre. 3G growing

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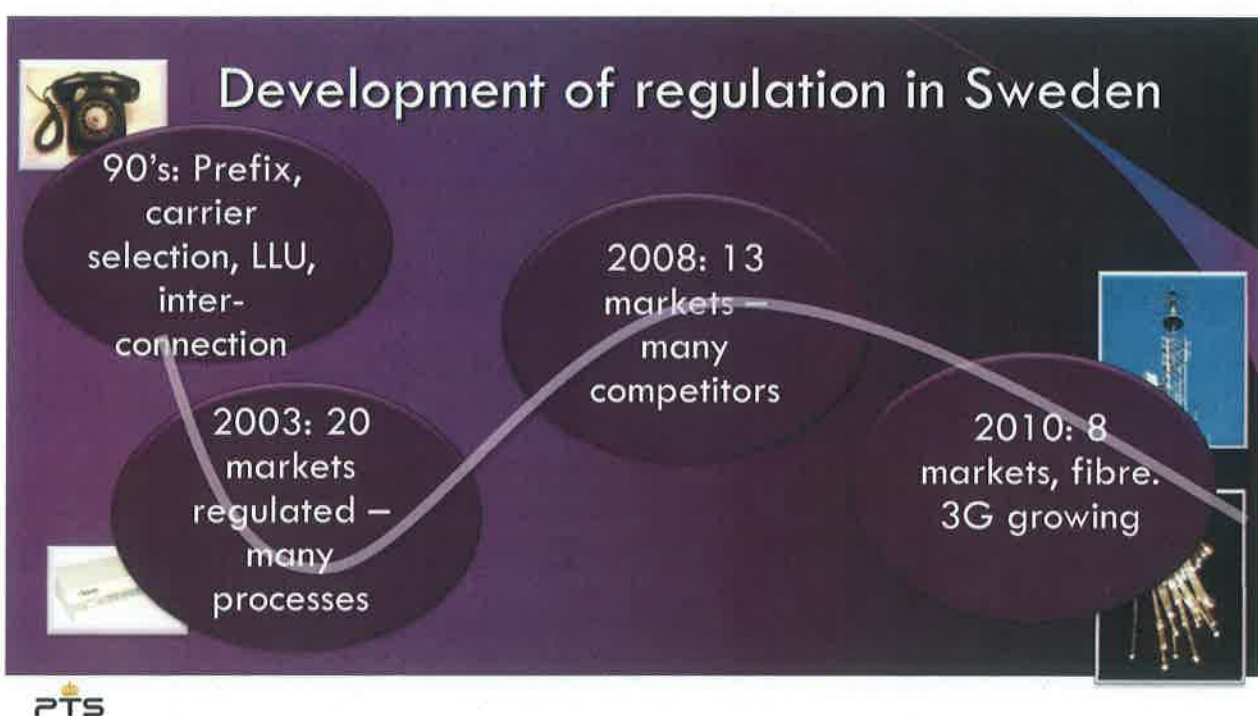
Regulation of fixed broadband markets

1:st 2004

Only copper

Access and price regulation

2:de 2010

Copper- and fibre access network

Access and price regulation om copper & fibre

3:de 2015

Copper- and fibre access network

Access, enhanced non-discrimination - no price regulation on fibre
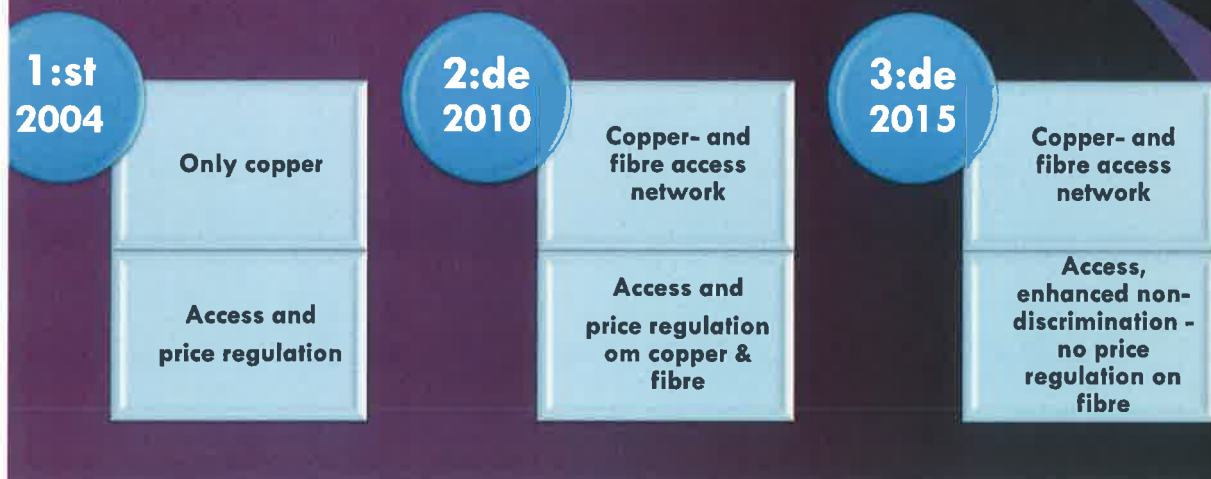
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What happens next?

- Swedish market almost fibrated
- New challenges for the markets
- Access to open fibre important
- Capacity and coverage important
- Symmetric regulation
- Simpler pricing models

PTS

Regulatory challenges in the future

- Demand for very high speeds

- Mobility – access to everything, everywhere

- Divergence of copper and fiber

- Convergence of fixed/mobile/circuit switched/IP

- Local markets

- "Oligopoly"

- Net neutrality

PTS

Inclusion of all as a vision

Exclusion   **Access**
Accessibility

Vote   Study   Watch

Work   Book

Pay

PTS

Thank you!

Broadband for all in Mexico

Mónica Aspe Bernal

Undersecretary of Communications
monica.aspe@sct.gob.mx
@maspeb

Broadband for all – fundamental for the transformation of our society
Stockholm, June 23rd, 2015

Mexico´s Telecom Sector before the Reform

2nd ▶
largest economy
in Latin America

20th
in Internet users

Source: World Bank, 2012

- Highly concentrated telecom markets

- Telecom services substantially more expensive than in most OECD countries

- Poor ICT indicators

Telecommunications Reform

SCT

- In 2013, the Federal Government and the main political parties agreed to a constitutional reform that radically changed the legal framework of the telecom sector

Legal Rights

- Right of access to ICT and the Internet
- Consumers' rights

Institutional Framework

- Federal Telecommunications Institute (IFT), independent regulator
- Specialized courts

Anti-trust Regulation

- *Ex ante* regulation of the dominant agent
- *Ex post* regulation of all other agents

Universal Access

- Shared mobile network (Red Compartida)
- México Conectado
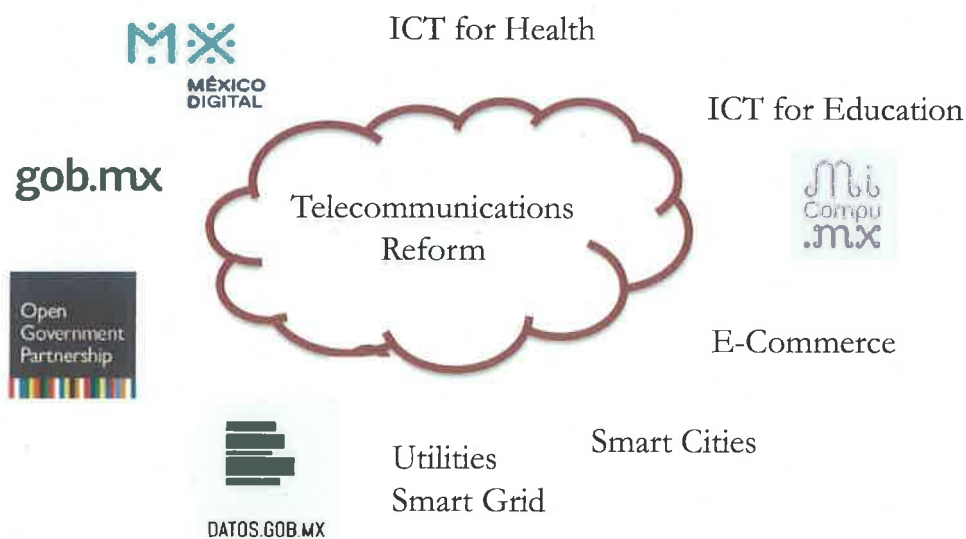
2

ICT for Development

SCT

- A vibrant telecommunications sector will unleash the digital ecosystem for Mexico´s social and economic progress

MX
MÉXICO DIGITAL

gob.mx

Open Government Partnership

DATOS.GOB.MX

ICT for Health

ICT for Education

Mi Compu .mx

Telecommunications Reform

E-Commerce

Utilities
Smart Grid

Smart Cities

First Results of the Telecommunications Reform

1 Mexico's international position is changing:

- OECD has stated that Mexican telecommunications regulation is now significantly less restrictive than the OECD average.

- In 2015 Mexico went up 10 slots in the WEF's annual Network Readiness Index.

2 From December 2012 to September 2014, wireless broadband subscriptions nearly doubled.

3 From March 2014 to March 2015, prices fell (national long distance -100%, international long distance calls -40%, mobile telephony -15%).

4 Between 2013 and 2014, the telecom sector GDP grew twice as much as that of the economy as a whole.

5 Foreign Direct Investment is now allowed up to 100% (over 6 billion dollars in FDI).

3

Red Compartida

SCT |

90 MHz of premium unencumbered contiguous spectrum on the 700 MHz band (703-748 MHz x 758-803 MHz)

RED COMPARTIDA

A wholesale shared network that enables the provision of telecom services through existing and new suppliers

6

Public Policy Goals

SCT

Increases coverage of mobile broadband services
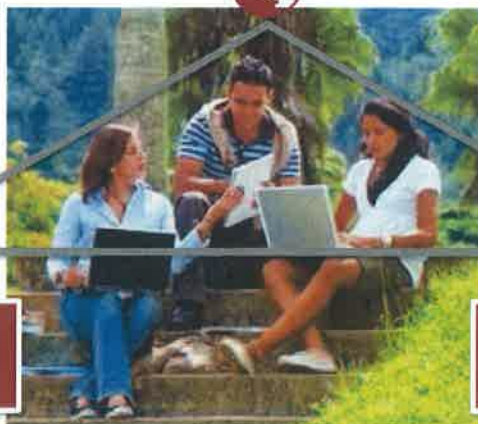
Reduce costs and promote competitive prices

Raise quality to international standards

Red Compartida is a critical component of the Mexican Government's vision of driving economic and social progress through universal access to ICT

7

The Coverage Challenge

SCT

Cities with more than 10,000 inhabitants: ~66% of total population

* Source: INEGI and CONAPO

8

The Coverage Challenge

SCT
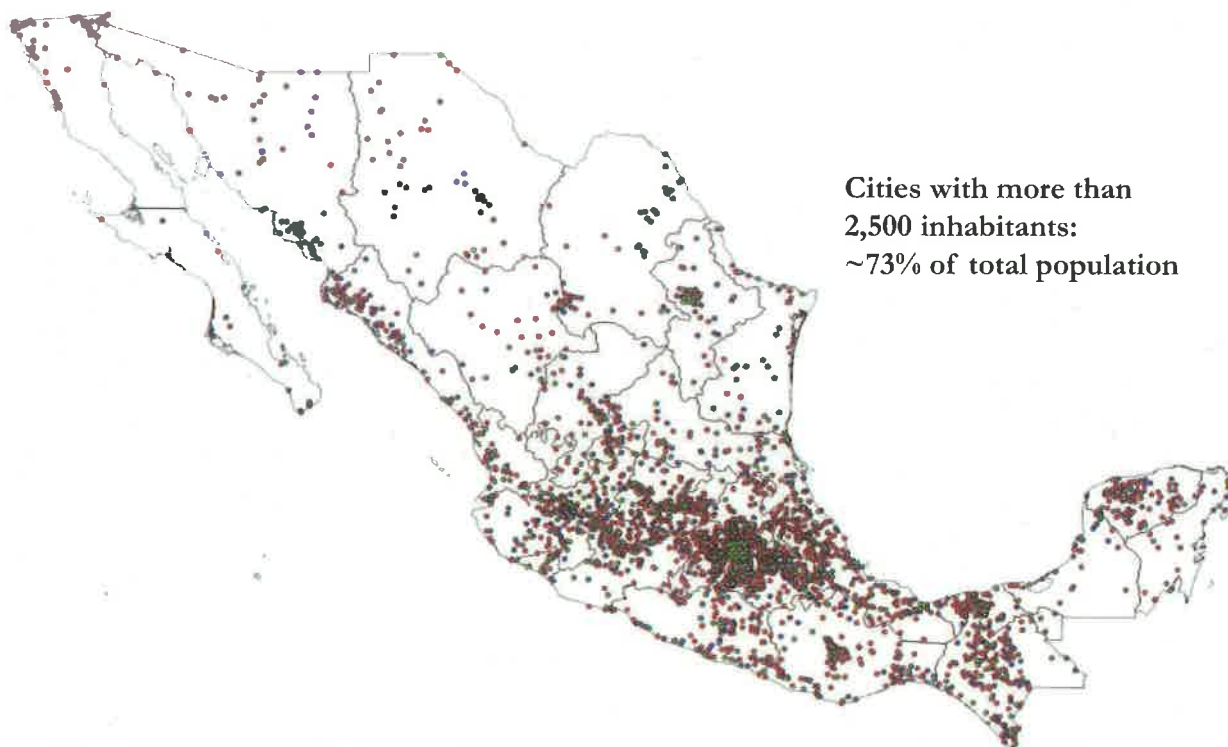
Cities with more than 2,500 inhabitants: ~73% of total population

* Source: INEGI and CONAPO

9

The Coverage Challenge

SCT

Towns with more than 500 inhabitants: ~91% of total population

Red Compartida´s coverage goal is to provide mobile broadband to over 90% of the population with 4G-LTE technology.

* Source: INEGI and CONAPO

10

4G-LTE Coverage is Still Limited

~66% of population in cities with > 10,000 inhabitants
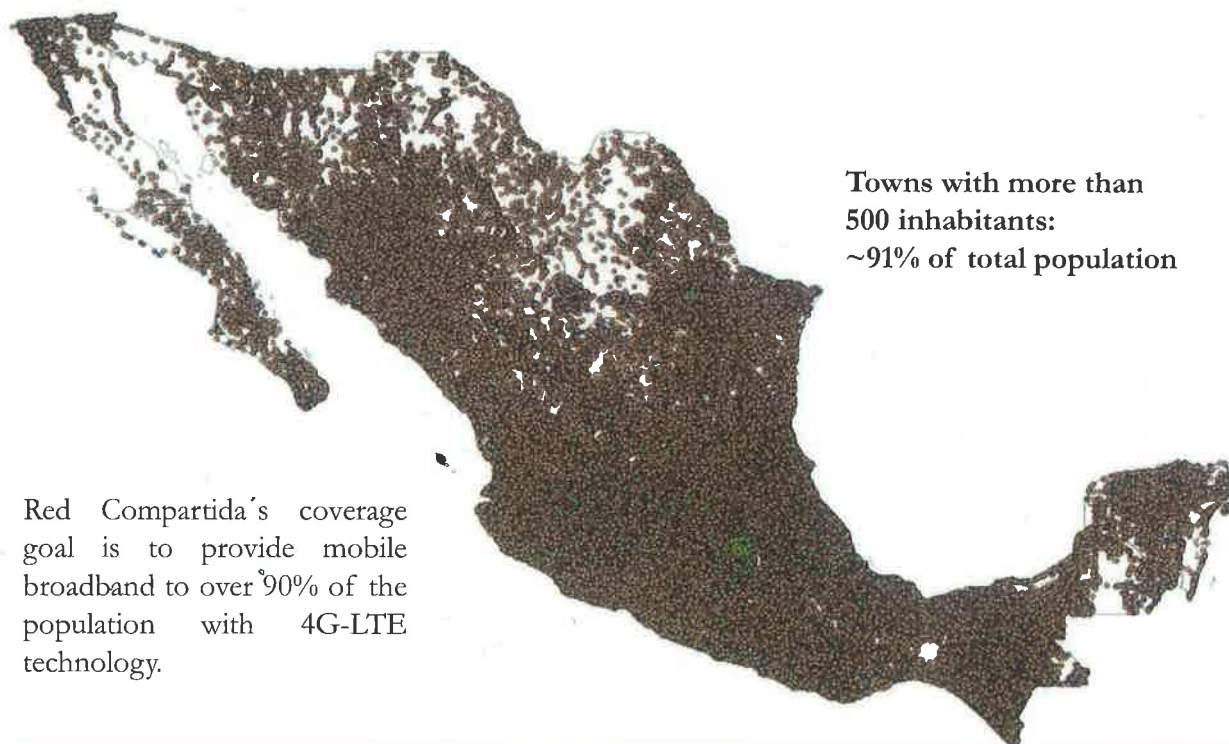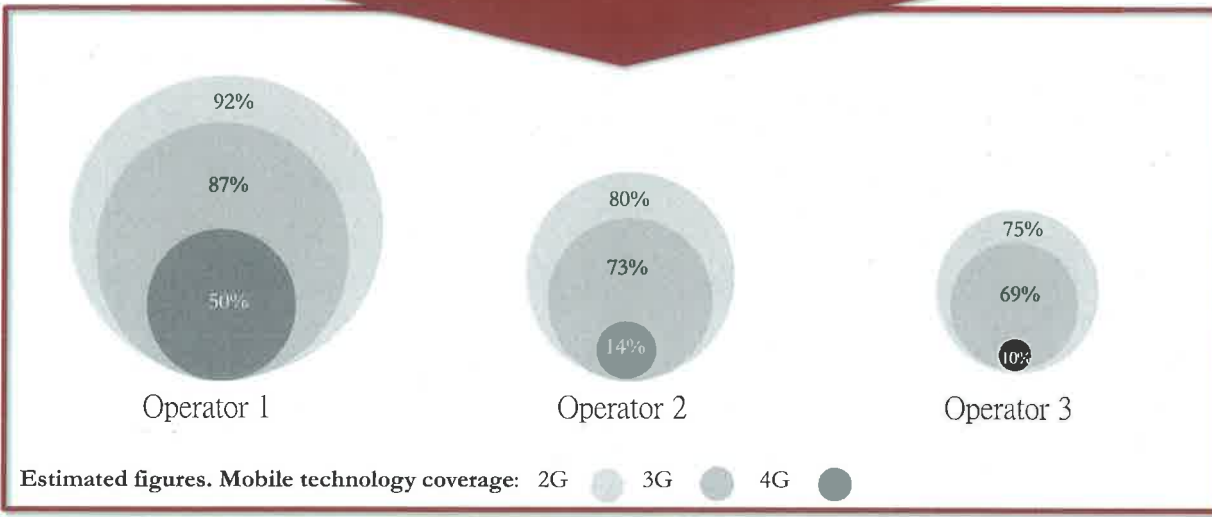
~9% of population lives in towns with < 500 inhabitants

92%

87%

50%

Operator 1

80%

73%

14%

Operator 2

75%

69%

10%

Operator 3

Estimated figures. Mobile technology coverage: 2G   3G   4G

11

Profitability and Coverage

- Doing business as usual, mobile services will not reach unprofitable markets. Red Compartida's model will allow coverage in otherwise unserved or underserved areas.
- The Government of Mexico will lead a tender process to establish a Public-Private Partnership, where the private partner will design, invest, deploy and operate the network.

Profitability

Positive net marginal benefit

Negative net marginal benefit

Greater cost of deployment (greenfield sites)

Population Coverage

12
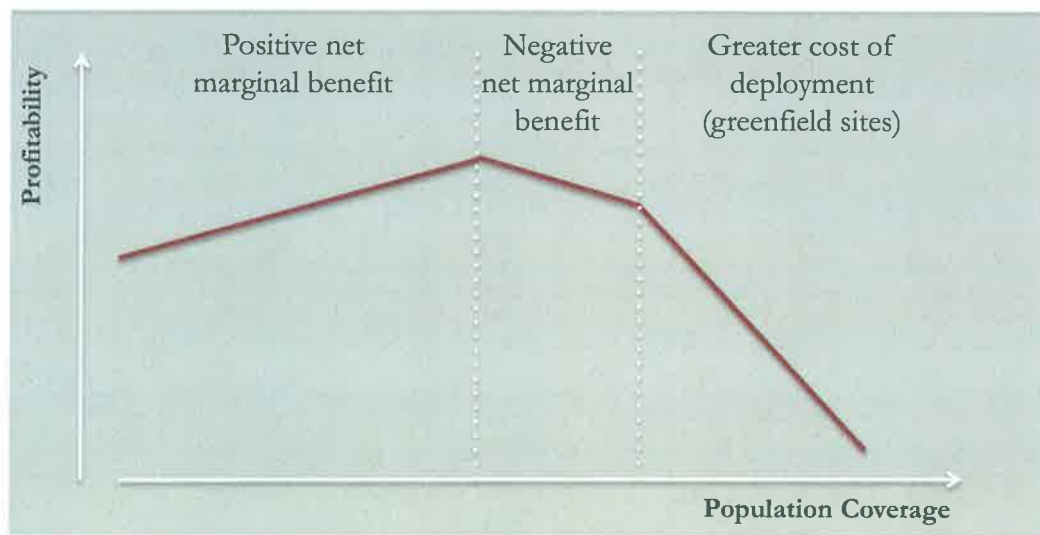
EOI Responses Signal Strong Interest

Type of companies that responded[1]

Consortium, 2

Industry Association/ University, 4

Network Installation Company, 4

Telecom Service Providers, 9

Total: 37

Consultancy, 6

Network Equipment Manufacturers, 7

Network Service Providers, 5

Geographical Distribution

APAC 5%

EMEA 13%

North America 23%

Latin America 54%

- 46% responses from global companies
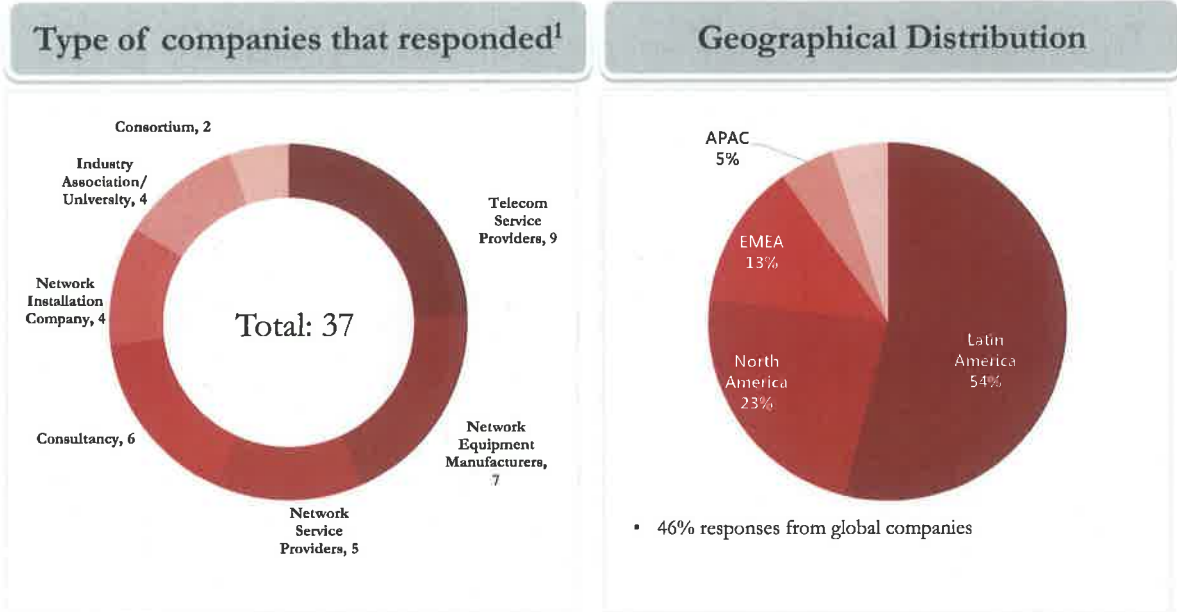
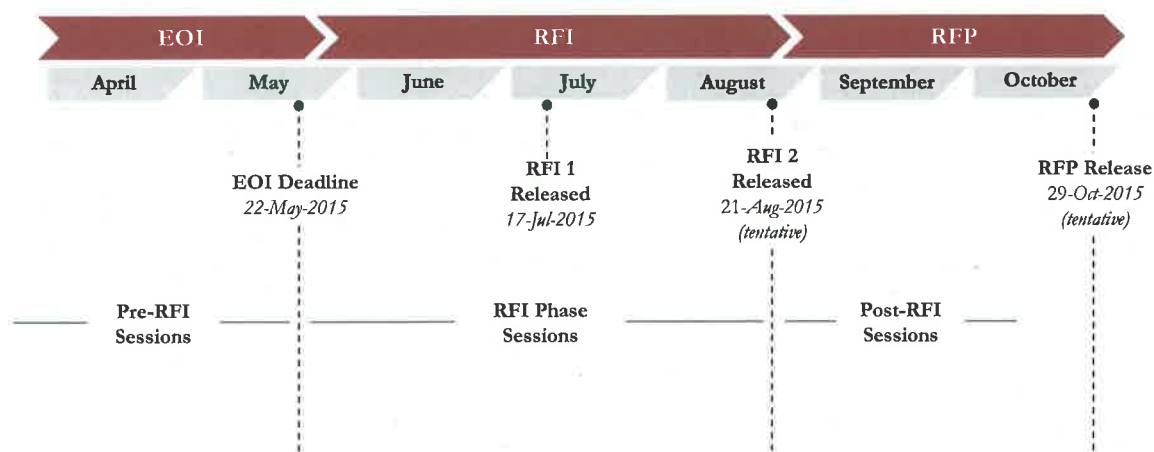Note: 1. A Telecom Service Providers – Includes Mobile, Fixed-line, Internet and Pay-TV operators, Network Service Providers – Includes providers of network solutions, technical capabilities, Ethernet / satellite operators, and maintenance service providers, Network Installation Company – Includes tower companies and network site construction companies

RED COMPARTIDA

15

Key Milestones in the Tender Process

EOI		RFI		RFP		
April	May	June	July	August	September	October

EOI Deadline 22-May-2015

RFI 1 Released 17-Jul-2015

RFI 2 Released 21-Aug-2015 (tentative)

RFP Release 29-Oct-2015 (tentative)

Pre-RFI Sessions

RFI Phase Sessions

Post-RFI Sessions

An information website will be launched, so investors may have accurate information about the most relevant aspects of the project (technical, financial and demand-related).

The RFP will be released in **2015**, with network deployment anticipated to begin in **2016** and operations scheduled to begin by the end of **2018**

16

Broadband for all in Mexico

Mónica Aspe Bernal

Undersecretary of Communications
monica.aspe@sct.gob.mx
@maspeb

Broadband for all – fundamental for the transformation of our society
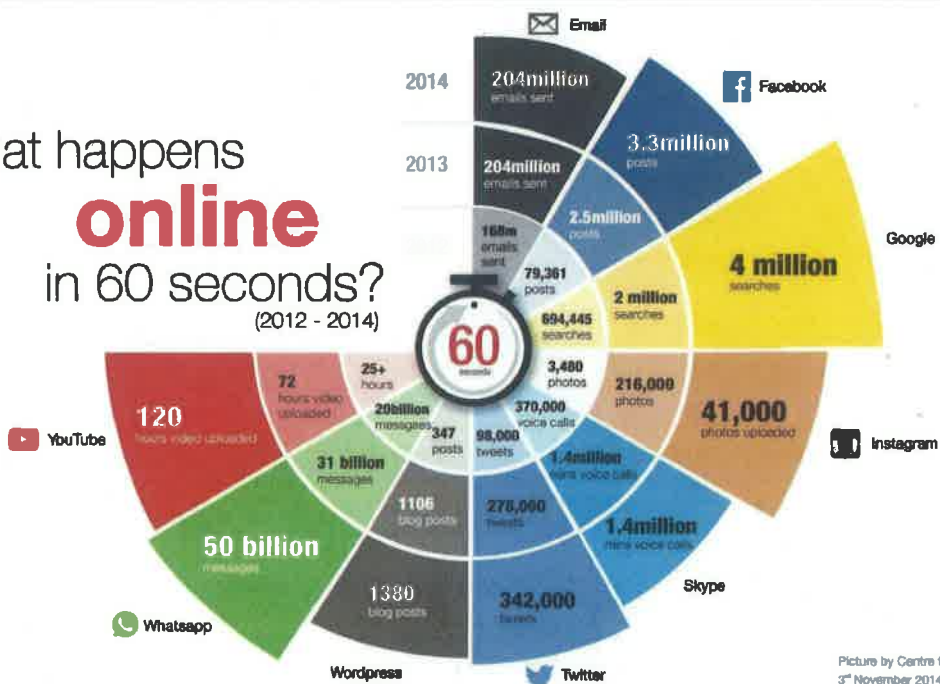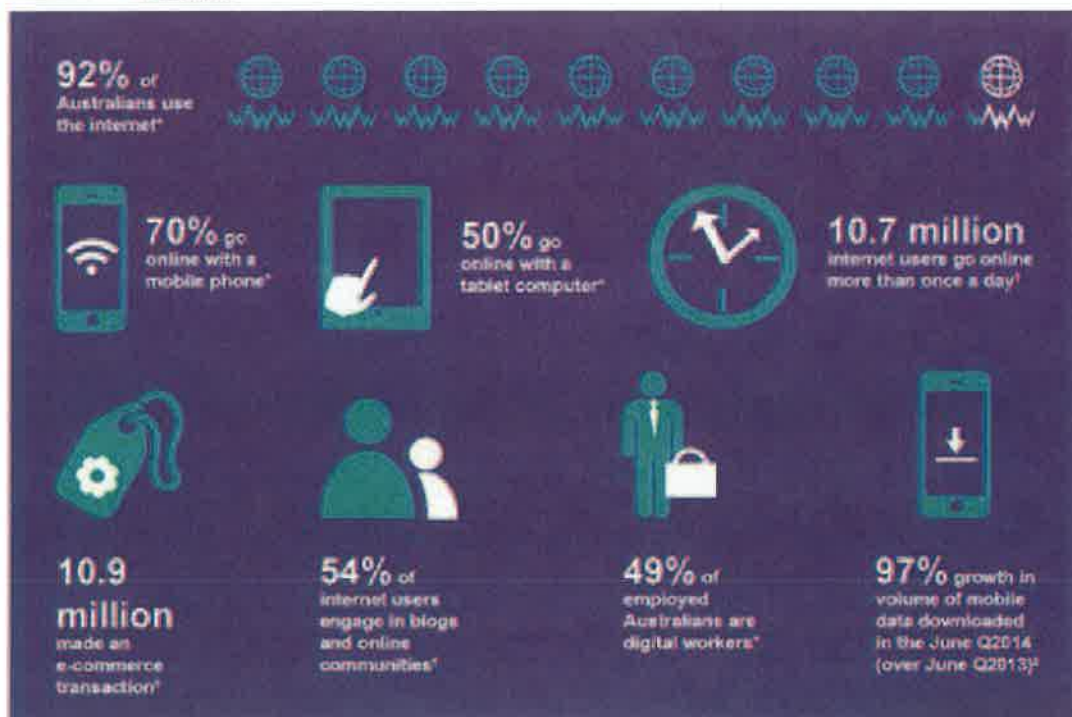Stockholm, June 23rd, 2015

Broadband for all in Australia

Richard Bean,
Deputy Chair,
Australian Communications and Media Authority
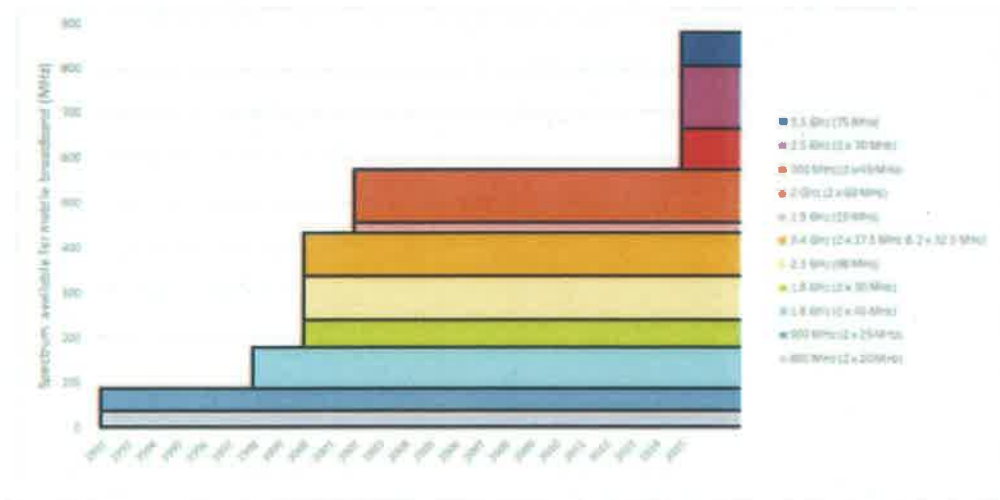**Ericsson Broadband for All**
Stockholm June 22-23, 2015

communicating | facilitating | regulating

History of release of spectrum suitable for mobile broadband services in metropolitan areas in Australia

Delivering mobile broadband capacity
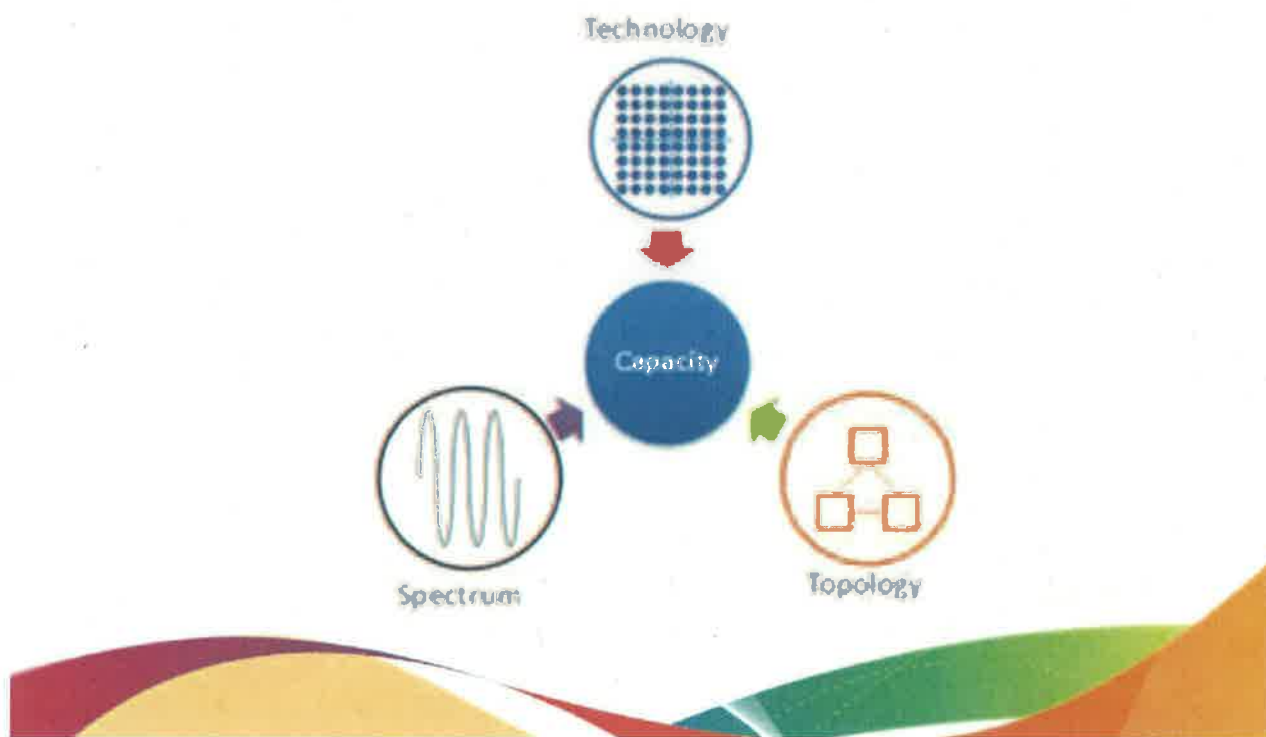
Summary of total licensed spectrum available for mobile broadband in selected countries

Country		Current	Pipeline	Current + Pipeline
USA		608	55+	663+
Australia		478	230	708
Brazil		554	0	554
China		227	360	587
France		555	50	605
Germany		615	0	615
Italy		540	20	560
Japan		500	10	510
Spain		540	60	600
U.K.		353	265	618

Note: US pipeline numbers do not include the significant amount of spectrum that will be made available for mobile broadband from incentive auctions and federal repurposing.

Boosting the economy

In 2013, mobile broadband has added

$33.8 billion
(that's 2.28% of our GDP)

of economic activity in Australia, with **$26.5** billion **(78%)**

due to **time savings** for business

A **quarter** of businesses surveyed said **adopting mobile broadband reduced costs**

Growth in mobile broadband productivity, use and **demand** has increased competition and affordability.
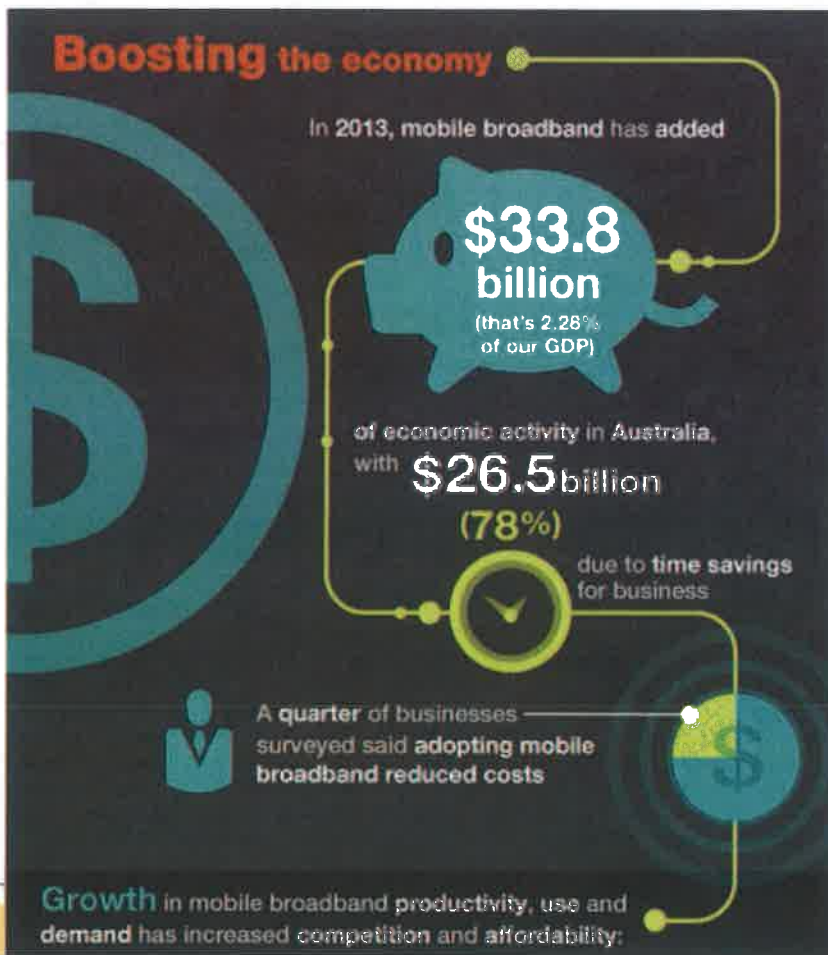
The Hon Malcolm Turnbull MP

Minister for Communications

Connect

Contact

Spectrum reform to drive future innovation and productivity

23 May 2014

The Government will review current spectrum policy arrangements to ease the compliance burden on users and improve accessibility for new technologies.

The efficient use of spectrum underpins the tablets, smartphones, televisions and radios Australians use every day.

It is essential to critical public and community services, such as police and emergency services communications, defence services, air and marine safety and weather forecasting.

The spectrum framework was last formally reviewed by the Productivity Commission in 2002. This was two years before Google went public and five years before the first iPhone was released. Clearly, the world has changed and it is time to take a

Machine-to-Machine Communications

Battle of the buzzwords: **M2M v IoT v IoE**

Machine to Machine
M2M

Internet of Things
IoT

Internet of Everything
IoE
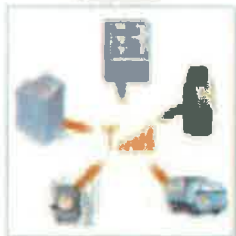
A *device*...
that captures an *event*...
transmits it over a *network*...
to an *application*....
that translates it into
meaningful information.

IDC

A network of uniquely
identifiable *"things"*
that communicate
*without human
interaction* using
IP connectivity
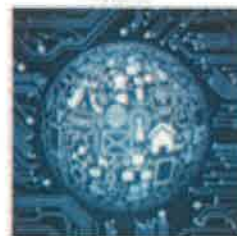
Bringing together the
people, process, data & things
to make networked
connections more relevant by
*turning information
into actions*.

2

Communications in Mining

RioTinto

*Changing mobile communication
needs:*

Mobile fleet data is increasingly
reliant on wireless connectivity

The Challenge: Develop a solution to track cattle cost effectively

A Real Radio Design Challenge
- ✓ **Ultra small device**
  - Ear tag
  - <20g weight including battery
- ✓ **3 year + in-field life**
  - 2 – 4 tx per hour
  - Small data packet
  - Robust design
- ✓ **Low cost network**
  - 5 – 10 km range
  - Low cost receivers
  - Receiver capacity >10,000 tags

Machine-to-Machine Communications

> **Growth of IoT devices**

> 2010   1.5 billions devices

> 2015   25 billion devices

> 2020   50 billion devices

> 2025   1000 billion devices
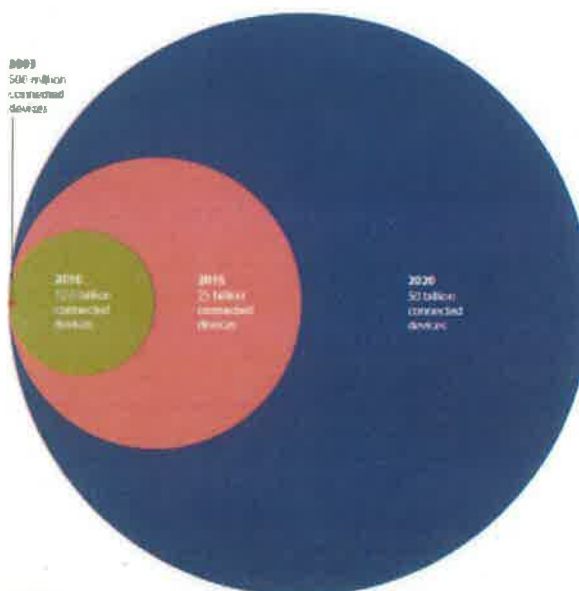
Something interesting is happening.
TOM GOODWIN

Proportion of Australian households that own technology item
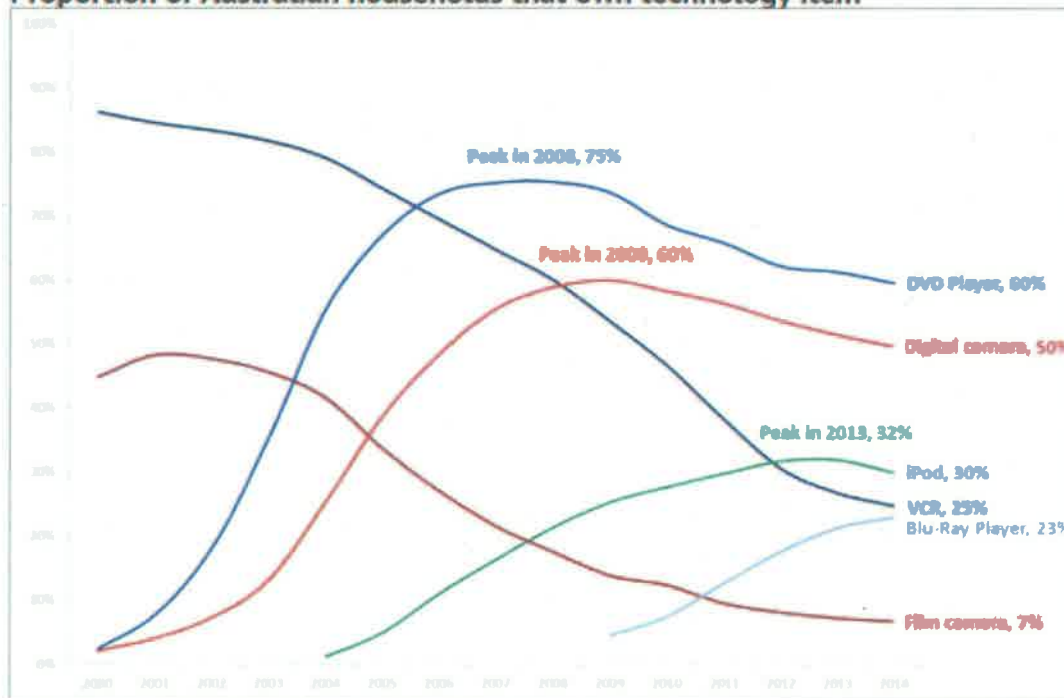
Source: Roy Morgan *Single Source*, January 20000 – December 2014. Average annual sample n = 54,034 Australians 14+

What it will actually mean to be a 'communications regulator'?

… the times demand the agility,
innovation and responsiveness of
start-ups, so
regulators should facilitate the market
to find and test its propositions.

Australian Government

acma

communicating | facilitating | regulating

Intelligent Transport Solutions & Automated driving

Ingela Sundin,
Head of Section Vehicle Engineering
ingela.sundin@transportstyrelsen.se

SWEDISH TRANSPORT AGENCY

11 june 2015

1

Subjects

- Pilot study of autonomous driving and project "Drive Me"

- Working fields nationally and internationally

- Development ahead

SWEDISH TRANSPORT AGENCY

11 june 2015

2

We are working for
the Ministry of Enterprise,
Energy and Communications

**SWEDISH
TRANSPORT
AGENCY**

Our areas

- **rules**
- **permits**
- **supervision**
- **statistics on accidents**
- **registries**

SWEDISH
TRANSPORT
AGENCY

11 june 2015

3

Challenges and trends

Congestion

Environment

Safety

Technology development provides
the opportunity to meet global
challenges and trends with
sustainable individual mobility

Health

Urbanization

Time

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TRANSPORT
AGENCY

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4

A pilot study

- **For identifying needs of revised legislation for allowing semi automated and full automated driving**

- **Step 1 – during tests "Drive Me"**
- **Step 2 – for future transportation needs**

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TRANSPORT
AGENCY

11 june 2015

5

A pilot study, indicating needs

- **More knowledge** and participation in tests (Drive Me)
- Monitoring ongoing **research** (national-ATS) and (international - ERTICO)
- **Establishing connections** with parties concerned
- **Work in EU** with ITS issues
- **Work in UNECE** to remove obstacles (if any) to provide harmonized approvals in EU.
- International **cooperation** NHTSA , DMV (California)

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AGENCY

Regulations and Responsibility

- **Regulations**
    - for use on and offroad, speed, location.....
    - regarding violations
    - regarding general product safety
    - for insurance issues
    - for work environment

- **Responsibilities for the driver – BASIC TODAY**

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Drive Me

100 Volvo cars to selected leasing customers between 2017-2018

Autonomous Driving (driver not supervising the drive) at selected roads

Approx. 50 km around Gothenburg

Autonomous parking

Drive Me
SELF-DRIVING CARS FOR SUSTAINABLE MOBILITY

SWEDISH TRANSPORT AGENCY

11 June 2015

8

Focus areas

Societal and economical benefits: improving traffic efficiency, traffic environment and road safety

Infrastructure aspects: suitable traffic situations

Customer expectations on used vehicles

Interaction with surrounding road users

Legal aspects

Drive Me
SELF-DRIVING CARS FOR
SUSTAINABLE MOBILITY

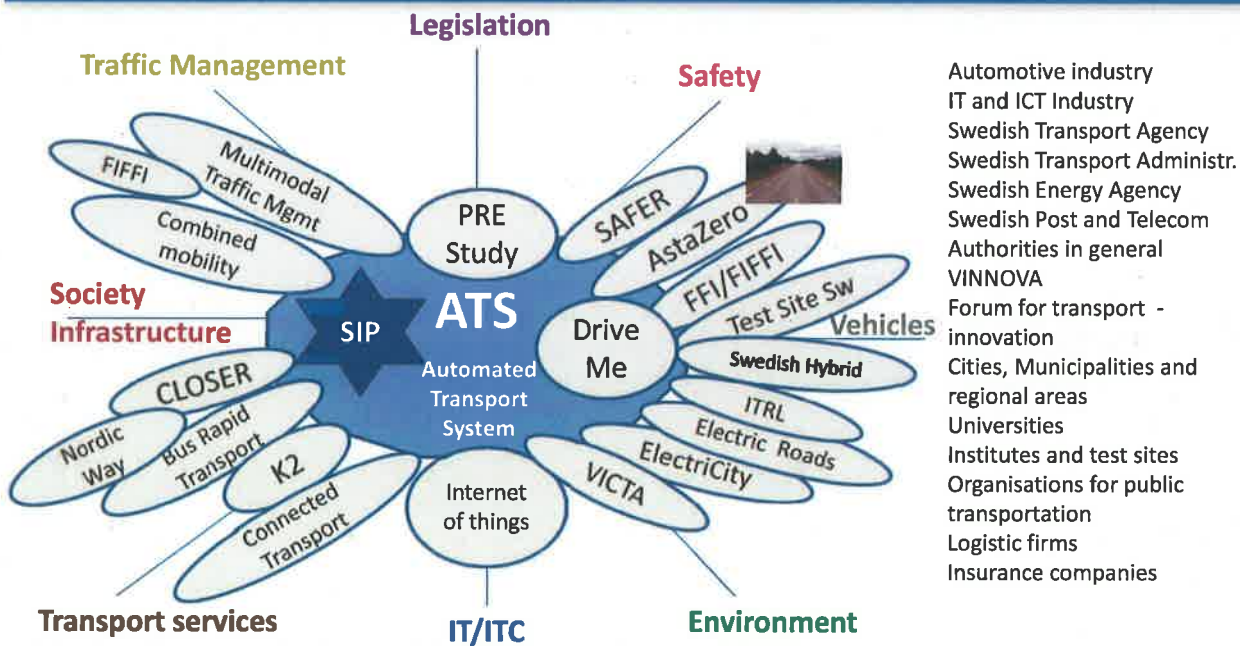**SWEDISH TRANSPORT AGENCY**

11 june 2015

9

Drive Me

TEST ROUTE

- Typical commuter routes in and around   Gothenburg
- Several lanes
- Frequent queues

Hisingen

Göteborg

Frölunda

Mölndal

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5
10

Research – some different initiatives

SIP – Strategic Innovation Programme

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11

EU-directive/regulations for ITS

EU-directive 2010/40/EC		
4 priority areas	I Optimal use of road, traffic and travel data	a/ Multi-modal journey planners
		b/ Multi-modal travel time Information Services
6 priority actions	II Continuity of traffic and freight management ITS services	c/ **Road safety-related minimum universal traffic information**
		d/ **Harmonised provision for an interoperable EU-wide eCall**
EIC	III ITS road safety and security applications	e/ **Information services for safe and secure parking places for commercial vehicles**
		f/ ~~Booking services for safe and secure parking places for commercial vehicles~~
C-ITS	IV Linking the vehicle with the transport infrastructure	Key performance indicators

EIC – European ITS Committee
C-ITS Cooperative ITS Systems

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12

11 june 2015

EU C-ITS = cooperative systems

Working groups	Meetings
1. **WP 1 Cost benefit analyses** 2. **WP 2 Business cases and business models** 3. **WP 3 Open legal issues** 4. **WP 4 Governance of the system and privacy** 5. **WP 5 Security and certification** 6. **WP 6 Technical issues** 7. **WP 7 Standardisation issues** 8. **WP 8 Public acceptance** 9. **WP 9 Implementation issues** 10. **WP 10 International cooperation** 11. **WP 11 Roadmap for deployment of C- ITS**	• November 2014: 3 (week 45) • December 2014: 3 & 4 (week 49) • January 2015: 20 & 21 (week 4) • February 2015: 24 & 25 (week 9) • March 2015: 10 & 11 (week ?) • April 2015: 1 & 15 (week 13) • 23 Afternoon (week 17) Platform plenary, next to ITS Conference • May 2015: 5 & 6 (week ?) • June 2015: 9 & 10 (week ?) • July 2015: 7 & 8 (week 28) WGs + Platform Plenary? • September 2015: 2 & 3 (week 36) 29 & 30 (week 40) 2 meetings? • October 2015: 27 & 28 (week 44) • November 2015: 17 & 18 (week 47) • December 2015: 8 & 9 (week 50) WGs + Platform Plenary

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13

ITS international area - UNECE

Global regulation

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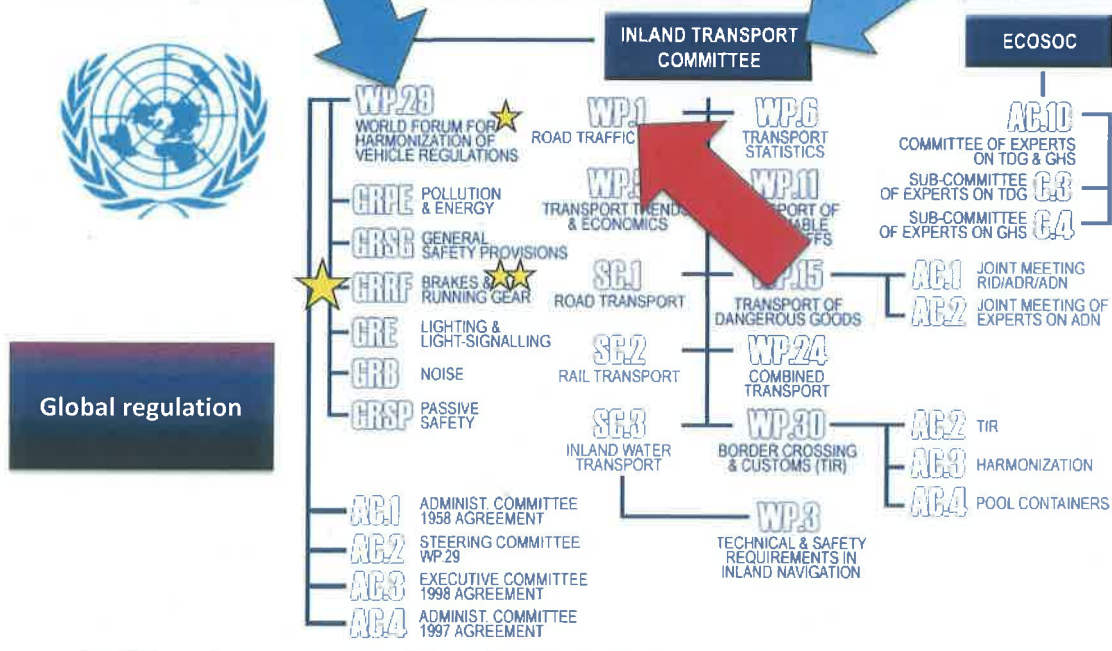
United Nations Economic Commission for Europe

Principles for automated driving today

The vehicle should have a driver, who is fit to drive at any time.

The vehicle should be designed to operate according to current legislation. The automated functions should be able to adjust the vehicle motion to the prevailing traffic situation in order to ensure the safety of vehicle occupants and surrounding road users at any time.

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Principles for – semi automation today

The vehicle should be designed to provide a safe transition from automated functions to non-automated functions.

The vehicle should have a fail safe mode that enables the vehicle to act in a safe way if the driver is not able or fit to regain control over the vehicle.

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Principles for – semi automation today

The use of automated functions should be acknowledged by both vehicle manufacturers and infrastructure providers.

The use of automated functions and automated driving should be acknowledged by the insurance companies.

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Future systems --------- NHTSA

		TEST	IN USE
0-1:	No or limited automation	✔	✔
	- Driver has major control		
2:	Specific functions of automation	✔	✔
	- An attending and alert driver.		
3:	Limited automated driving	✔	?
	– The driver allows the vehicle to drive itself automatically during specific conditions, driver is in the vehicle.		
4:	Fully automated driving	?	?
	- The driver is not obliged to monitor the vehicle in the driving loop. Driver could be out of the vehicles reach		

SWEDISH TRANSPORT AGENCY

Thank You for listening

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AGENCY

ICT TRENDS
IN THE TRANSPORT & VEHICLE SECTORS

Olle Isaksson
Head of Strategy, Industry & Society
Ericsson AB

THE TRANSPORT SYSTEMS

People

Vehicles

Infrastructure

Goods
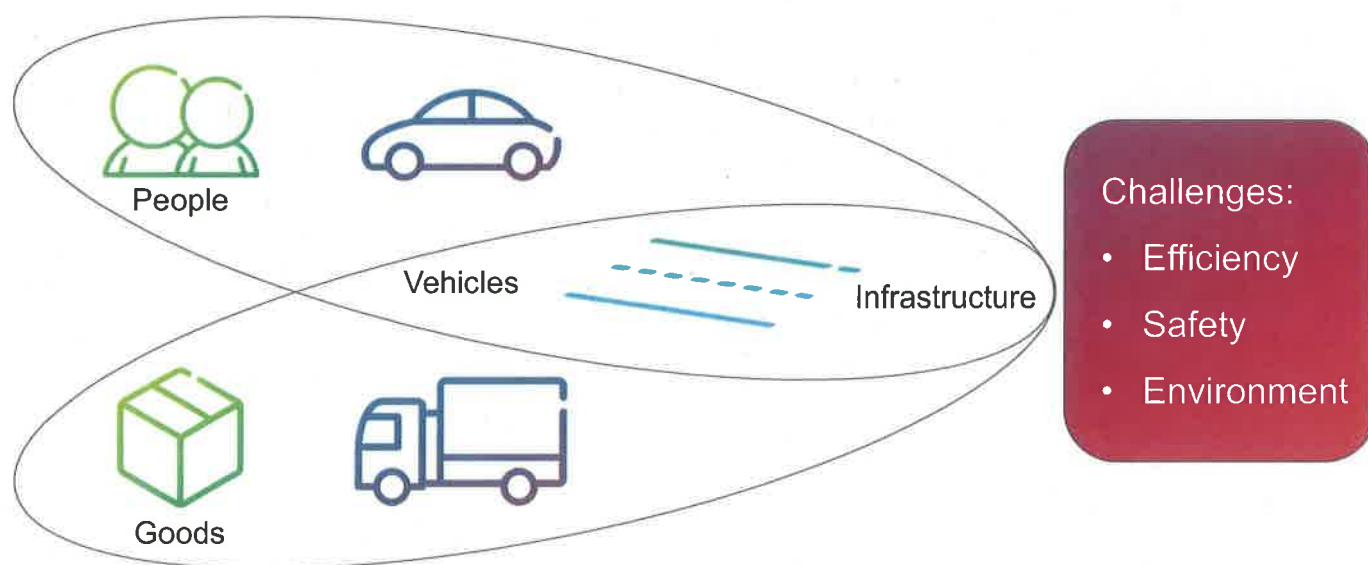
Challenges:
- Efficiency
- Safety
- Environment

MWC 2015 | Ericsson Internal | 2014-09-30 | Page 2

THE CONNECTED COMMUTER

THE CONNECTED CAR

THE CONNECTED ROAD

Fees & Charges
- Road Usage Charging
- Congestion fees
- Parking booking and fees

Infotainment
- Bill-boards
- Traveler information

Traffic Efficiency
- Traffic Analysis
- Cameras and signs
- Traffic alerts
- Traffic light mgmt
- Green corridors

Traffic Safety
- Traffic Hazard warnings
- Sensors for road status
- Intelligent Speed Adaptation
- Road-work safety
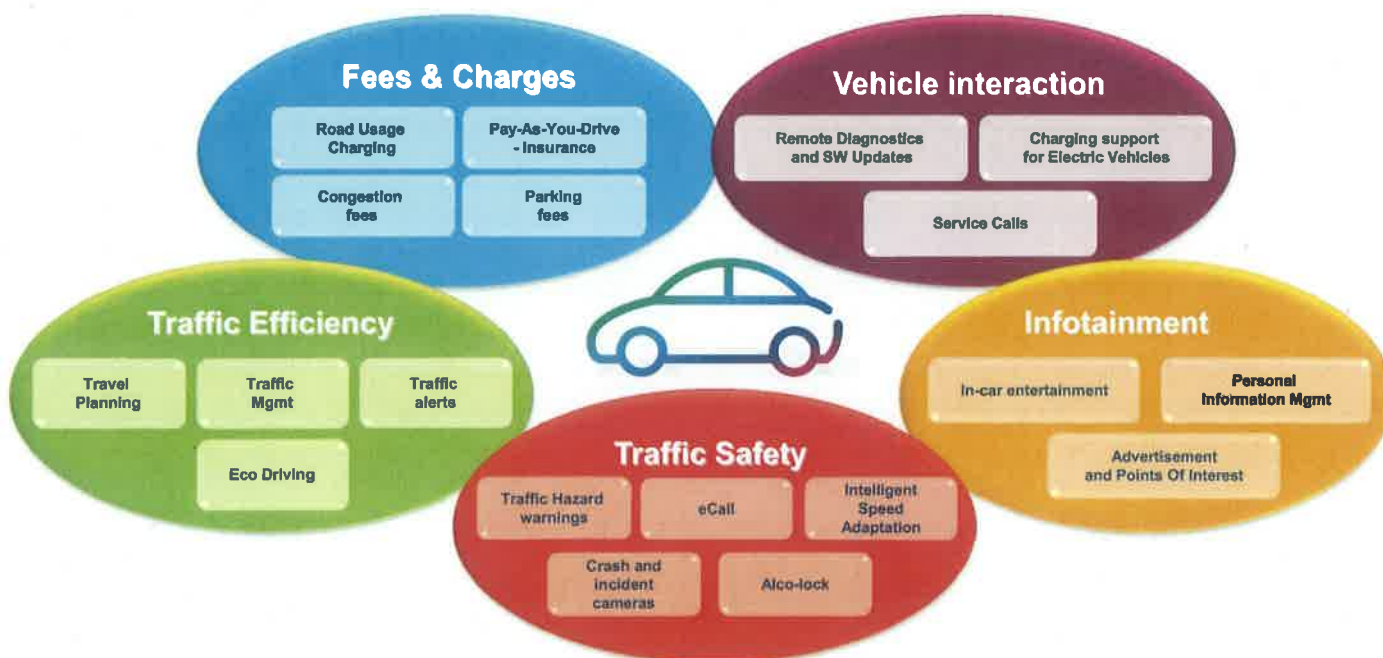
Ericsson Internal | 2013-10-14 | Page 5

MULTIMODAL TRANSPORT SYSTEM

People   A   B

Goods   A   B

SERVICES

Infotainment
Fees & charges
Transport safety
Traffic efficiency
Traffic efficiency
Transport safety
Fees & charges
Goods mgmt

MWC 2015 | Ericsson Internal | 2014-09-30 | Page 6
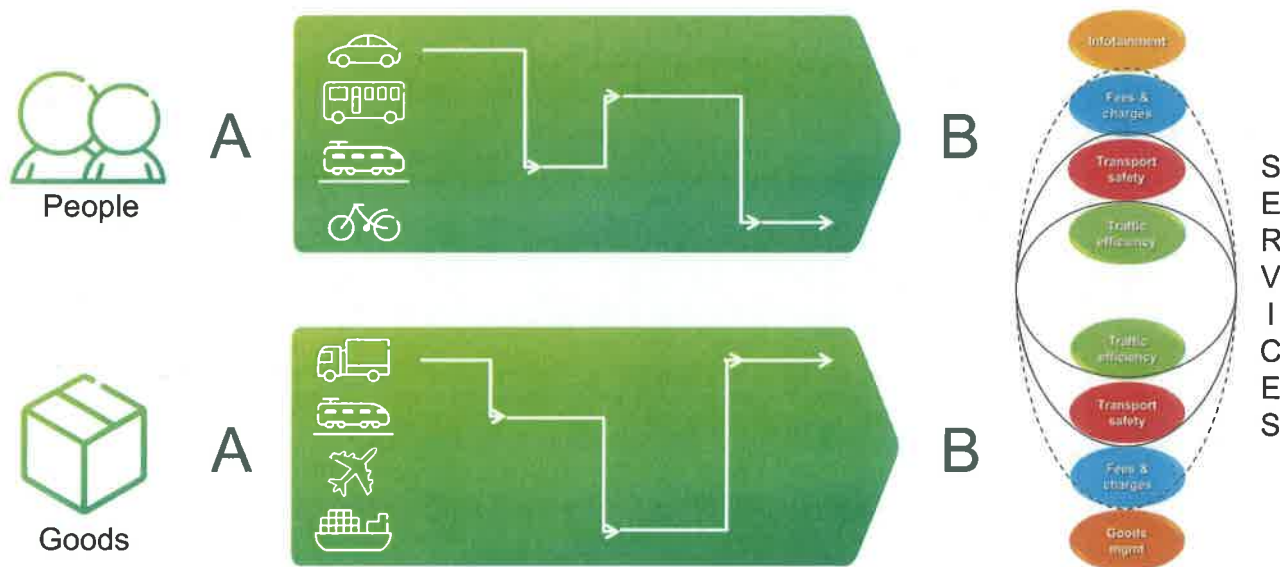
OUR FRAMEWORK FOR INTELLIGENT TRANSPORT

User Experience Management

Traffic efficiency | Fees & charges | Vehicle interaction | Transport safety | Infotainment | Goods mgmt

Service and Information Management

Asset & Device Management

Connectivity Management

ICT infrastructure Management

People

Goods
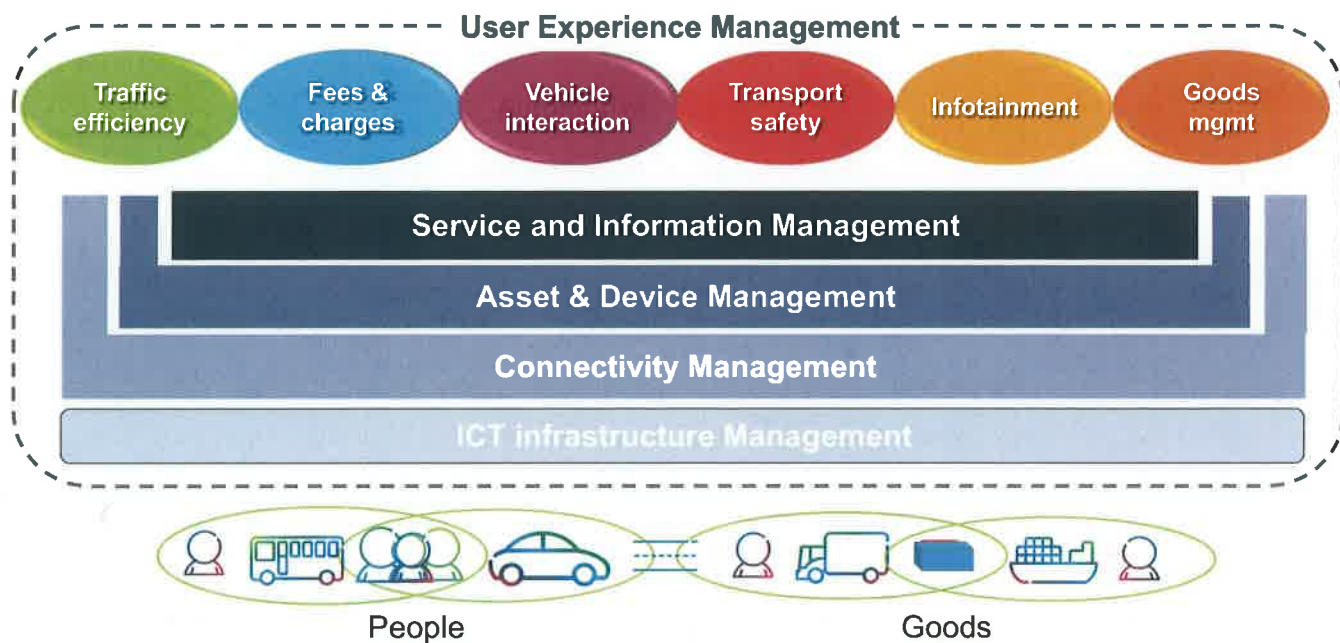
Ericsson Internal | 2013-10-14 | Page 7

TOMORROW STARTS NOW

CONNECTED | COOPERATING | AUTOMATED

ELECTRIFICATION
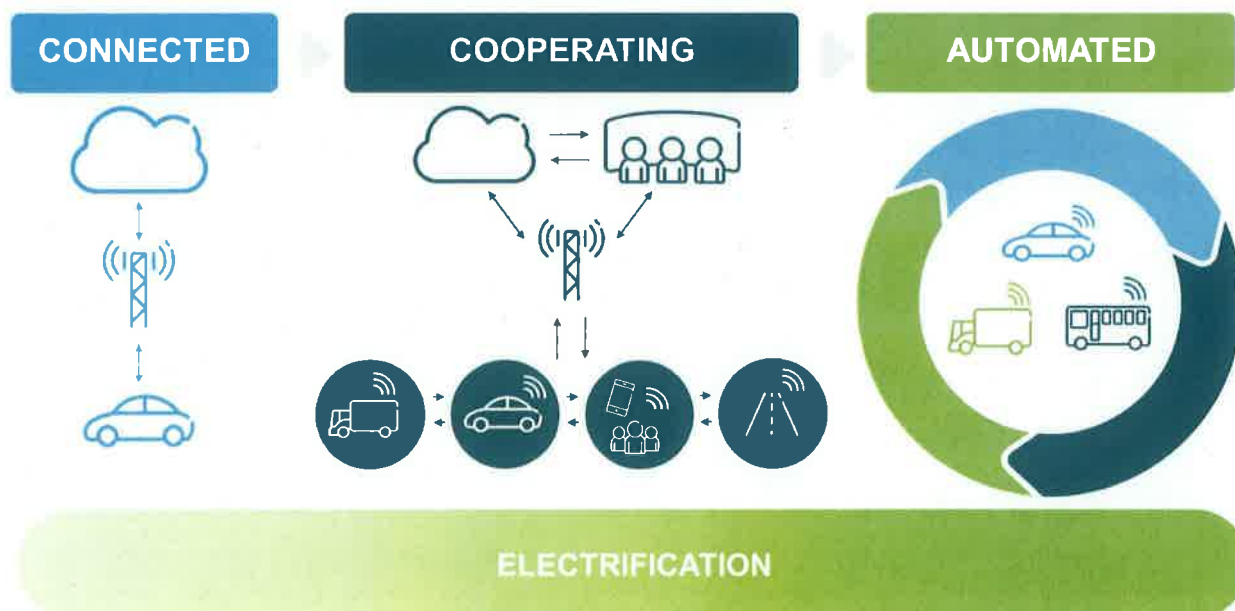
MWC 2015 | Ericsson Internal | 2014-09-30 | Page 8

SUCCESSFUL CROSS-INDUSTRY WORK FOR MANY YEARS

COOPERATIVE CARS (COCAR, COCARX)
- Joint innovation on cooperative systems

VW DAIMLER MAN vodafone ERICSSON
Ford vodafone bast ERICSSON

ELVIIS
- Electrical vehicle charging

Viktoria Institute Göteborg Energi ERICSSON

CONVERGE
- Next steps on cooperative systems, combining ad-hoc and cellular communication

bast BOSCH Fraunhofer
PTV GROUP STADT FRANKFURT AM MAIN vodafone VW
htw saar

HEERO
- eCall testing and verification

HEERO
Harmonised eCall European Pilot

C-ITS - From research to operation | Commercial in confidence | 2015-05-20 | Page 9

COMPLEMENTING TECHNOLOGIES

Cellular communication ← → Ad-hoc communication

Traffic information
Online Navigation
Software download
Remote Diagnostics
Infotainment
Autonomous Driving support
Cooperative traffic lights
Hazard warnings
Intersection assistant
Lane change assistant
Platooning
Collision avoidance

(NLOS← → LOS)

2G (EDGE)
3G (HSPA)
4G (LTE)
Ad-hoc radio (G5, DSRC, etc)
Flexible usage
5G
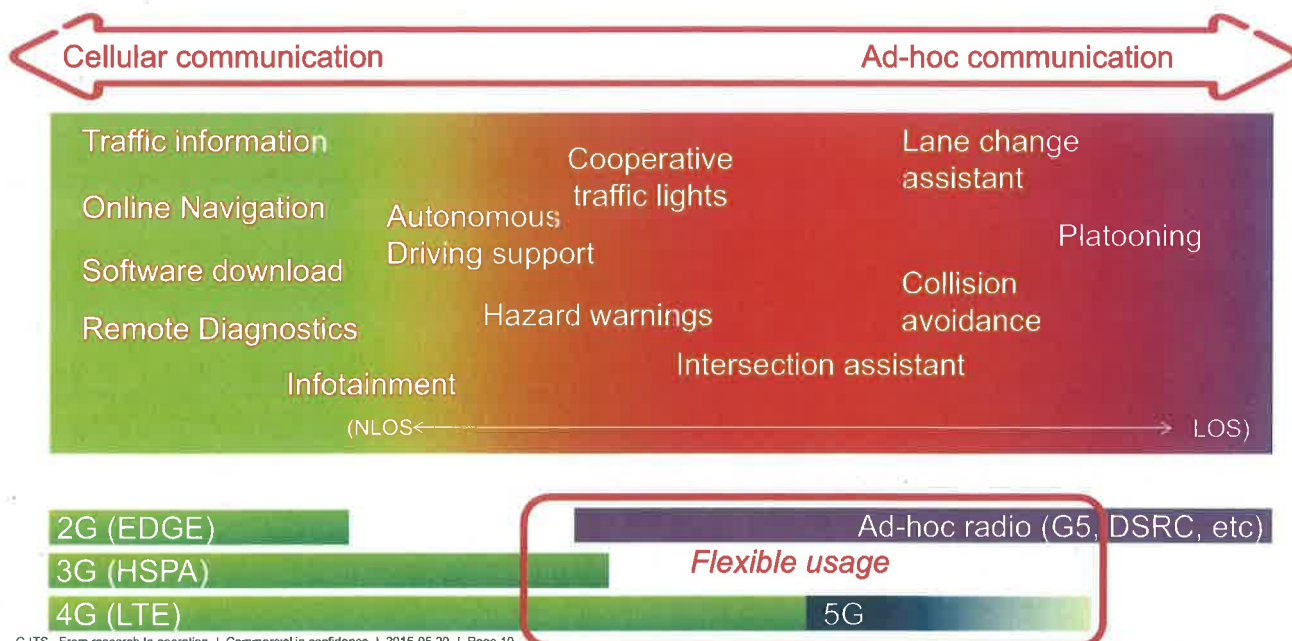
C-ITS - From research to operation | Commercial in confidence | 2015-05-20 | Page 10

WHAT IS REAL-TIME?

› Road-Hazard-Warnings
  – Over 3G HSPA networks
    in less than 0.5 seconds (2009)

› Intersection assistance
  – Over 4G LTE, with automatic braking,
    with less than 100 ms interaction
    latency (demonstrated 2011)

› Important message first
  – RHW and traffic messages
    while viewing HD video

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CAR-TO-CAR OVER CELLULAR

Hazard Warning
accident, emergency breaking, bad road
condition, road works, slow vehicle

Traffic
Management
Center

Core Network
Infrastructure

Filtering/
GeoMessaging

Traffic Information updates
traffic condition & warnings

C-ITS - From research to operation | Commercial in confidence | 2015-05-20 | Page 12
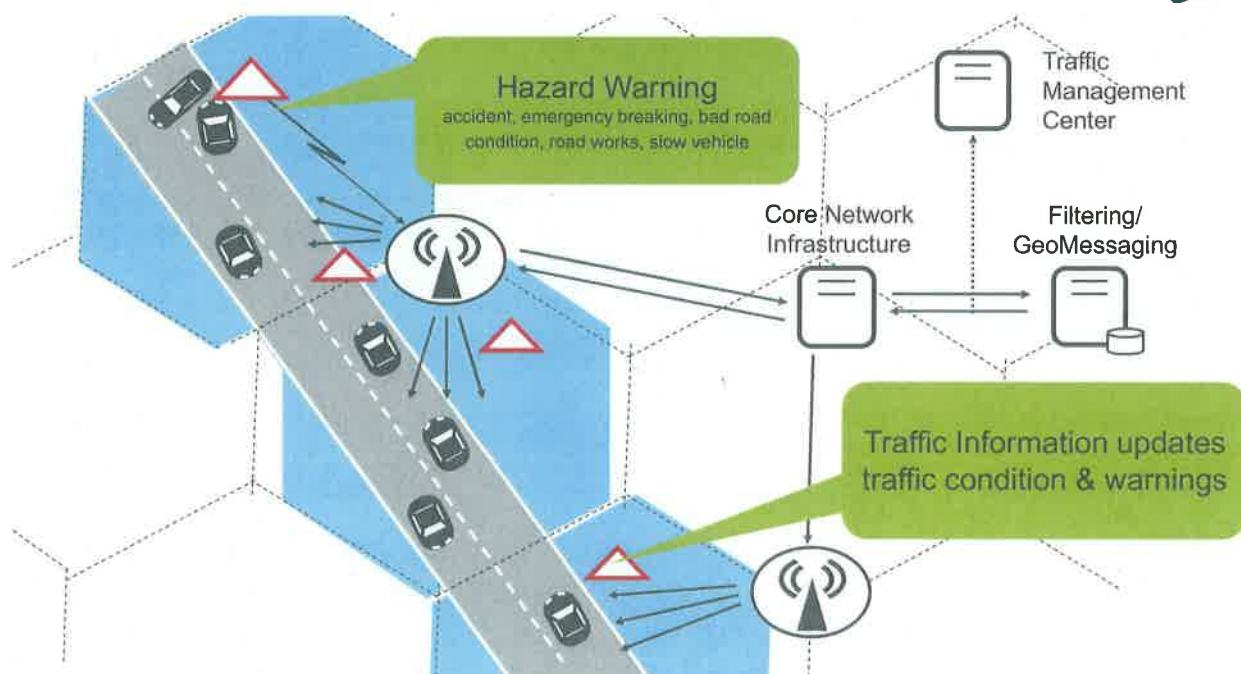
GEO-MESSAGING ENABLEMENT

› Optimized for cellular

› Minimal user data traffic
  – 2 km tiles, 4hrs driving / day
    => 350 kByte / month

› Provides client anonymity and privacy

› Highly scalable solution

› Enables very low e2e latency
  – 3G with latency < 500 ms
  – LTE ("4G") < 100 ms

Right information to the right place at the right time

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LTE CAR-TO-CAR DELAY

C-ITS - From research to operation | Commercial in confidence | 2015-05-20 | Page 14
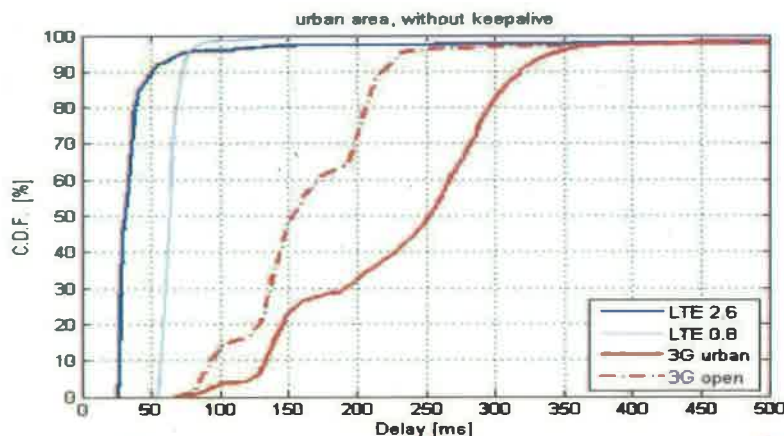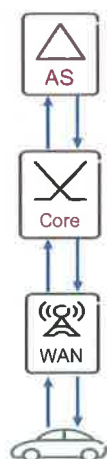
HYBRID COMMUNICATION

› A simple example:
  - A Road Operator spotting a wrong-way-driver
    at its big CCTV traffic flow video wall
  - The person in charge should **NOW have a Red Button**
    to point the map at the wrong-way-driver spot and …

› … instantly, virtually cry out a wrong-way-driver-warning
  message over …
  - ALL kinds of communication channels, with
  - ALL "communication-channel operators" that offer coverage
    in the effected geographic area
  - Utilizing ALL kinds of "communication technologies"

C-ITS - From research to operation | Commercial in confidence | 2015-05-20 | Page 15

HYBRID COMMUNICATION

› Communication technologies in scope
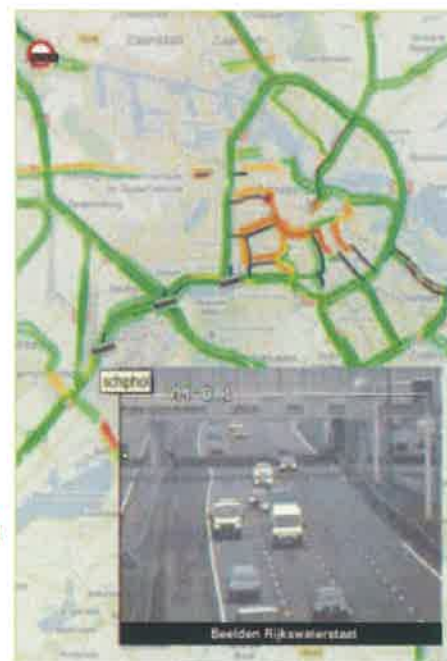 - Cellular 3GPP communication (e.g. HSPA, LTE, LTE-A, …)
  - ETSI ITS G5 (802.11p) communication, via so called RSUs (road-site-stations networks)
  - Via the road-operators' own VMS (Variable Message Sign) systems
  - Via public broadcast channel providers (FM radio, RDS-TMC, DAB+ TPEG, etc)
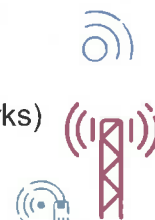
› Communication channel operators
  - All MNOs that provide cellular coverage in that effected area
  - the one (or maybe two) operators of an ETSI ITS G5 RSU-network along the effected roads
  - the road-operator's own VMS operation system (might be run by an outsourced partner)
  - the different broadcasters, serving that area

C-ITS - From research to operation | Commercial in confidence | 2015-05-20 | Page 16

CONVERGE – A NEW C2X APPROACH

› Open up vertical integration of access networks and service providers

› Flexible usage of communication networks
› Exchange of service data

› Multi-operator architecture
› Suited for international deployment
› Role-based design approach

CONNECTED TRAFFIC CLOUD

Connected Traffic Cloud

Connected Traffic Safety

Connected Traffic Management

TRAFFIC MANAGEMENT

Reaching out to vehicles and road users
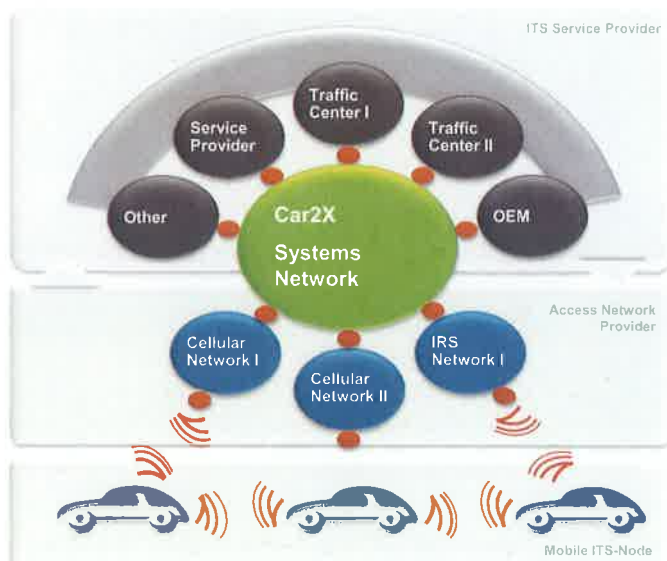
Sharing aggregated anonymous data

CONNECTED VEHICLE CLOUD

› Connecting vehicles to the outside world

› Live with Volvo cars since 2013
› Available in 160 markets
› Recognized winner of industry awards in telematics, M2M and infotainment

› Sharing architecture and operation capabilities with Connected Traffic Cloud

MWC 2015 | Ericsson Internal | 2014-09-30 | Page 21
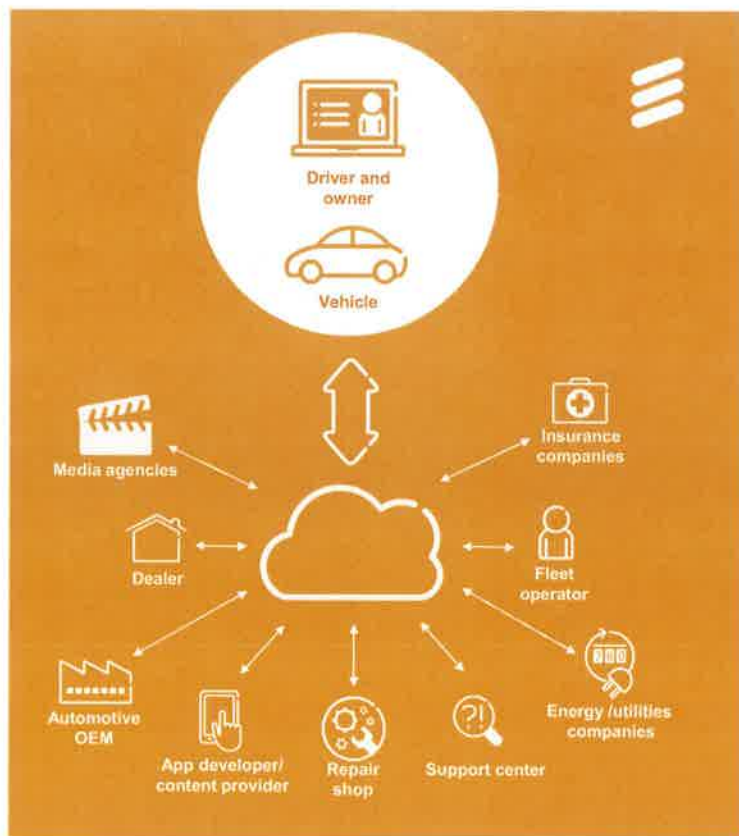
TRANSFORMING LOGISTICS?

5G WIRELESS ACCESS

Multiple Integrated Wireless/Access Solutions
enabling the long-term Networked Society
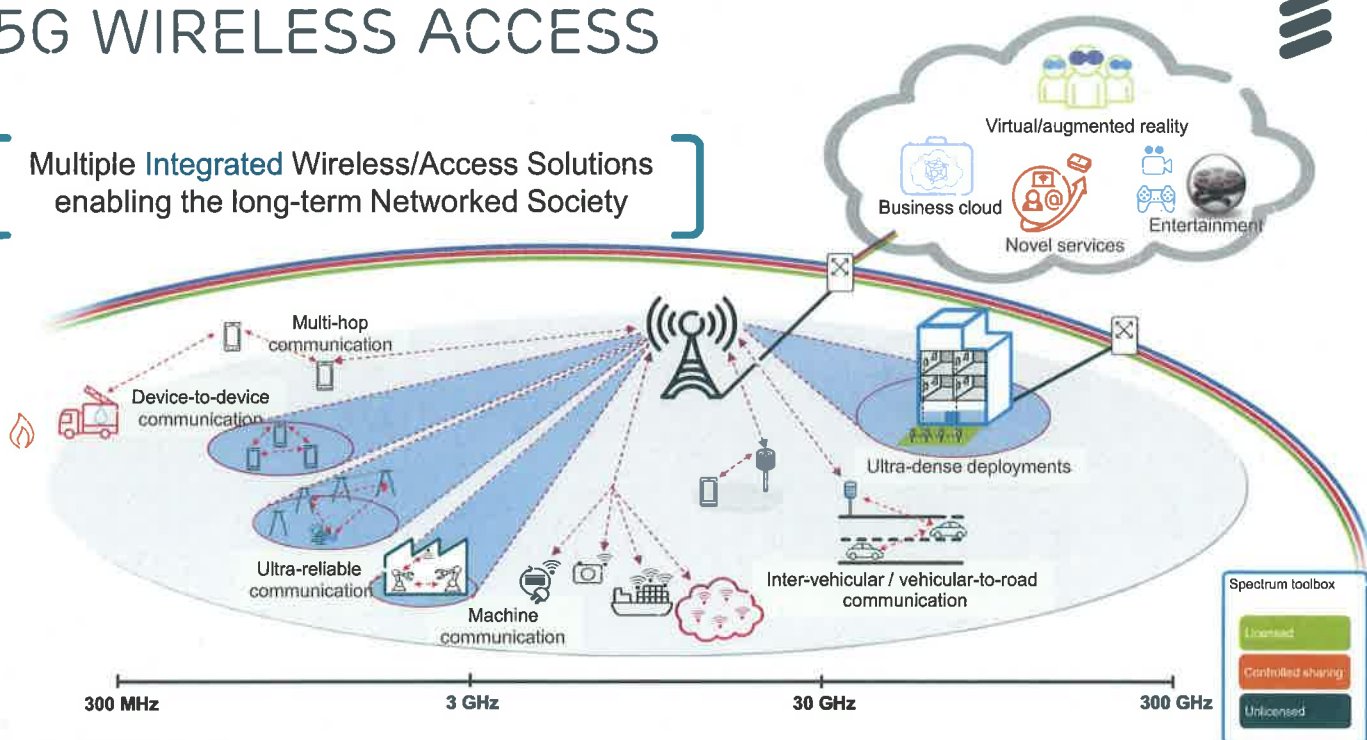
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ERICSSON

NETWORKED SOCIETY GUIDE FOR POLICY MAKERS

RENE SUMMER ■ NAGY HANNA ■ JUNE 2015 ■

ERICSSON

ICT BENEFITS - HOLISTIC VIEW

STANDARD OF LIVING

QUALITY OF LIFE

WELL BEING

NATIONAL COMPETITIVENESS

SOCIAL PROGRESS

ICT BENEFITS AS ENABLERS OF SOCIO-ECONOMIC CHANGE

IMPACT FROM ICT

DIRECT INDIRECT INDUCED

0 1 5 20 years

TECHNOLOGICAL CHANGE INNOVATION

ECONOMIC PERFORMANCE

INCREMENTAL

RADICAL

TRANSFORMATIVE

GROWTH

CHANGE
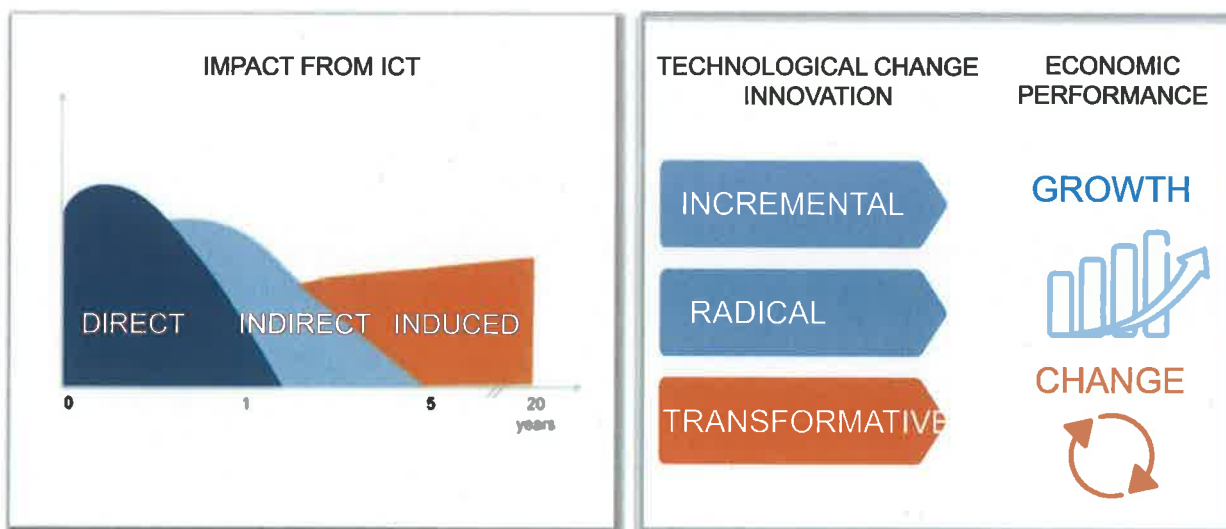
Sources: Chalmers Institute of Technology, Arthur D Little,
OECD Broadband and the Economy, Future of Internet 2008

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GOV' ADDRESSING ICT BENEFITS
134 NATIONAL BROADBAND PLANS IN 2014

SCOPE OF NBP IS EXPANDING – DIGITAL ECONOMY

100%
88% 86% 82% 81% 75% 66% 65% 64% 45% 37% 31% 29% 14%

Infrastructure | Education | Governance & Citizens Participation | Employment | Health | e-Gov Apps/Services | Tech Transfer | PPP | Youth | Access for People with Disability | Poverty reduction/Food safety | Gender | Other

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Source: ITU/UNESCO Broadband Commission for Digital Development

GOV' DELIVERING A CHANGE
SIX VERSIONS OF A PROMISE OF A CHANGE

VISION	→	SKILLS	→	INCENTIVES	→	RESOURCES	→	ACTION PLAN	= SUCCESS
X	→	SKILLS	→	INCENTIVES	→	RESOURCES	→	ACTION PLAN	= CONFUSION
VISION	→	**X**	→	INCENTIVES	→	RESOURCES	→	ACTION PLAN	= CONCERN
VISION		SKILLS	→	**X**	→	RESOURCES	→	ACTION PLAN	= RESISTANCE
VISION	→	SKILLS	→	INCENTIVES	→	**X**	→	ACTION PLAN	= FRUSTRATION
VISION	→	SKILLS	→	INCENTIVES	→	RESOURCES	→	**X**	= OPTIMISM
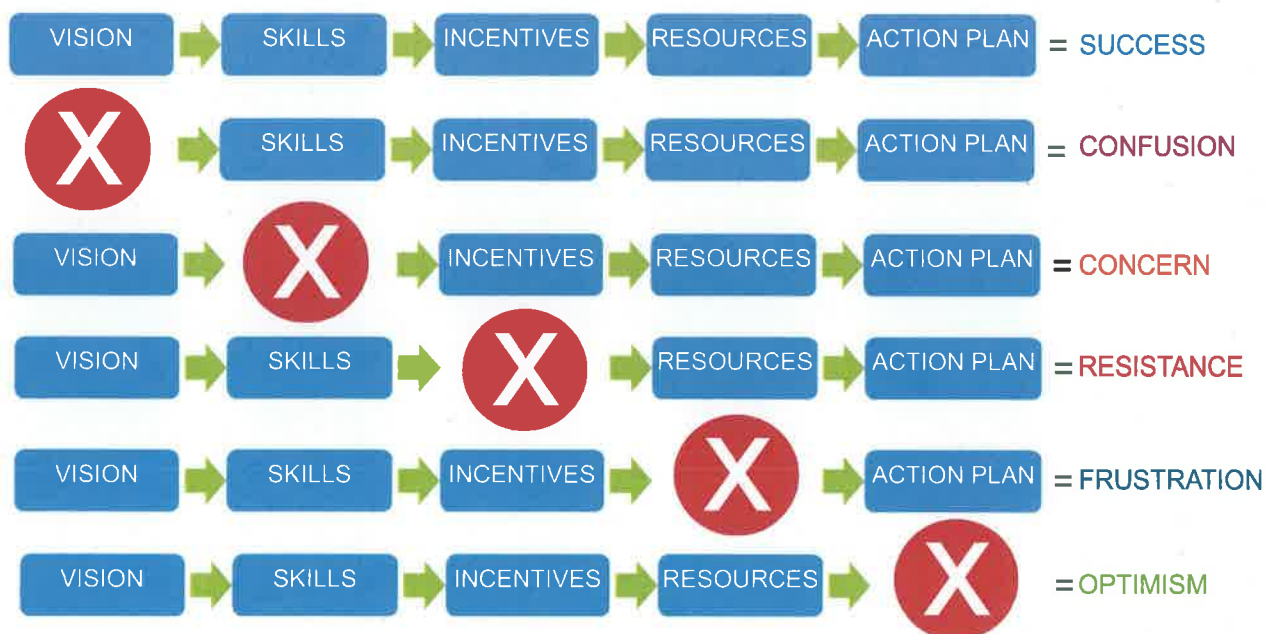
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WHY WE NEED THE GUIDE?

Nagy K. Hanna

TRANSFORMING TO A NETWORKED SOCIETY

GUIDE FOR POLICY MAKERS
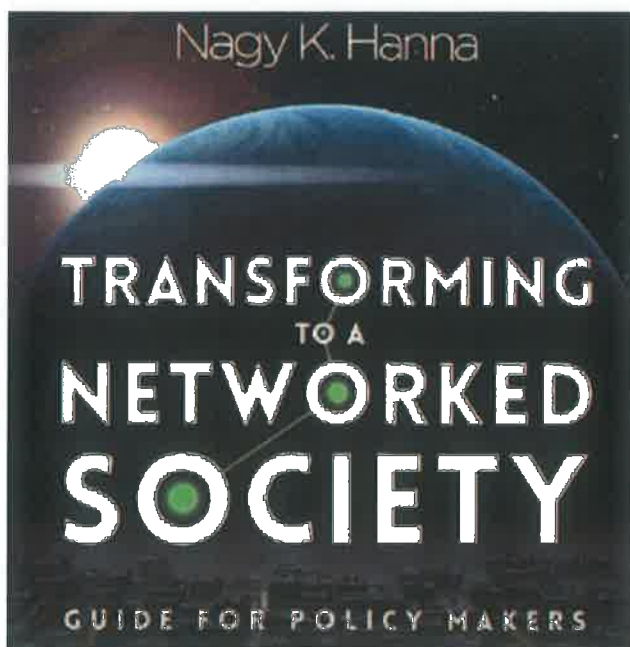
› Help building a long term commitment
› Preparing for the transformational journey
› Integrating supply and demand side policies
› Organizing and implementing institutional change
› Executing and delivering on a change

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STRATEGIC FRAMEWORK FOR TRANSFORMATION

Private and Public Sectors
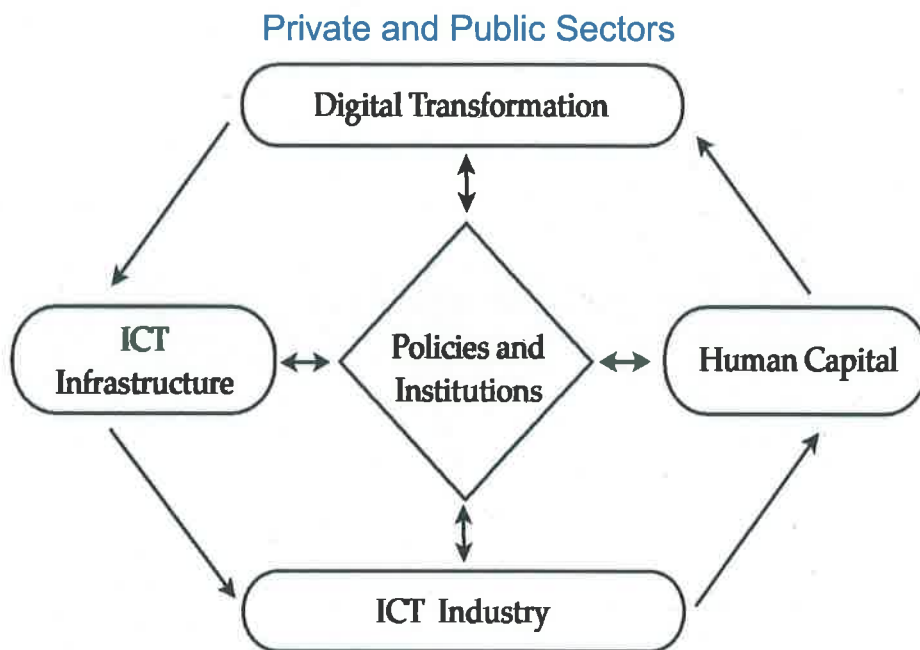
STRATEGIES FOR INTEGRATING
ICT LED TRANSFORMATION AND DEVELOPMENT

PUBLIC POLICY STRATEGY APPROACH

A SOLID IMPLEMENTATION PLAN
A SUCCESSFUL CHANGE (ILLUSTRATIVE)
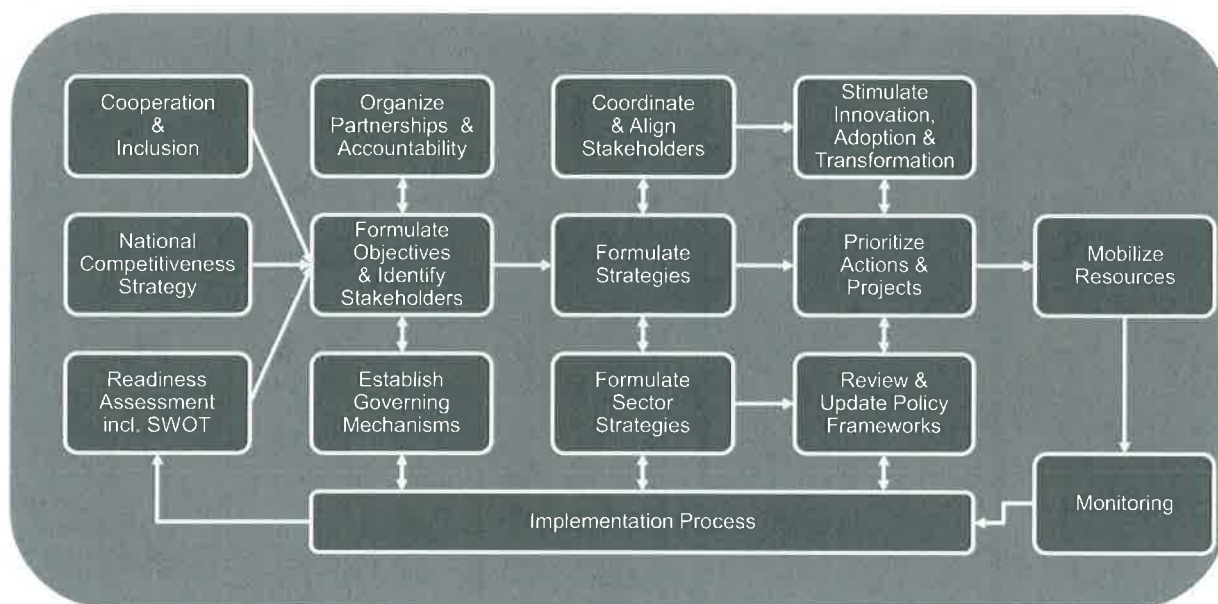
Source: Ericsson Analysis inspired by, Transforming Government and Building the Information Society, Hanna 2010.

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# KEY BARRIERS TO ICT ENABLED TRANSFORMATION

› Vested interests and resistance to reforms
› Wasting scarce development resources
› Unmet expectations
› Eroding competitive positions
› Exacerbating Inequalities

Page 10

DEEPENING TRANSFORMATION IN SECTORS: E-GOV, E-EDUCATION, E-HEALTH, ETC.

› Vision: client-centered, on demand, info driven, integrated, learning systems

› Align sector governance, strategy, policy, incentives, skills, culture, with ICT transform.

› Take a whole sector view: shared infra., open data & standards, common portal.

› Nurture innovation, scale.

› Integrate with enablers/horizontals.

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MASTERING THE DIGITAL TRANSFORMATION PROCESS

DEVELOPING KEY SUCCESS FACTORS:

› Leadership and institutional capabilities

› Enabling policies and regulation

› A high-quality Broadband & IT infrastructure

MOBILITY - BROADBAND - CLOUD

DEVELOPING LEADERSHIP & INSTITUTIONAL CAPABILITIES

› Institutional options
- Shared Responsibility Model
- Core Ministry Model > Investment coordination
- Lead Ministry Model >Technical coordination
- Administrative and Technical Coordination Model
- Designated e-Development Agency Model > Holistic coordination

› Trends in e-leadership institutional options

ENABLING POLICIES - POLITICAL ECONOMY OF DIGITAL TRANSFORMATION!

WHAT DOES IT TAKE TO MAXIMIZE BENEFITS FROM ICT ENABLED TRANSFORMATION

PUBLIC INSTITUTIONS & POLICY
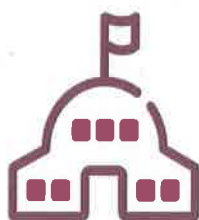
- Wise policies, that shape right incentives …
- Not all profit seeking is beneficial…
- Continue to deal with market failures but also
- Reactionary public institutions,
- Regulatory failures
- Systemic failures > State – different layers of authority – alignment –

CREATING INCENTIVES TO DO RIGHT THINGS

REMOVING BARRIERS TO DO THINGS RIGHT

REMOVING BARRIERS TO DO RIGHT THINGS

ENABLING REGULATION - KEY ICT POLICY ISSUES

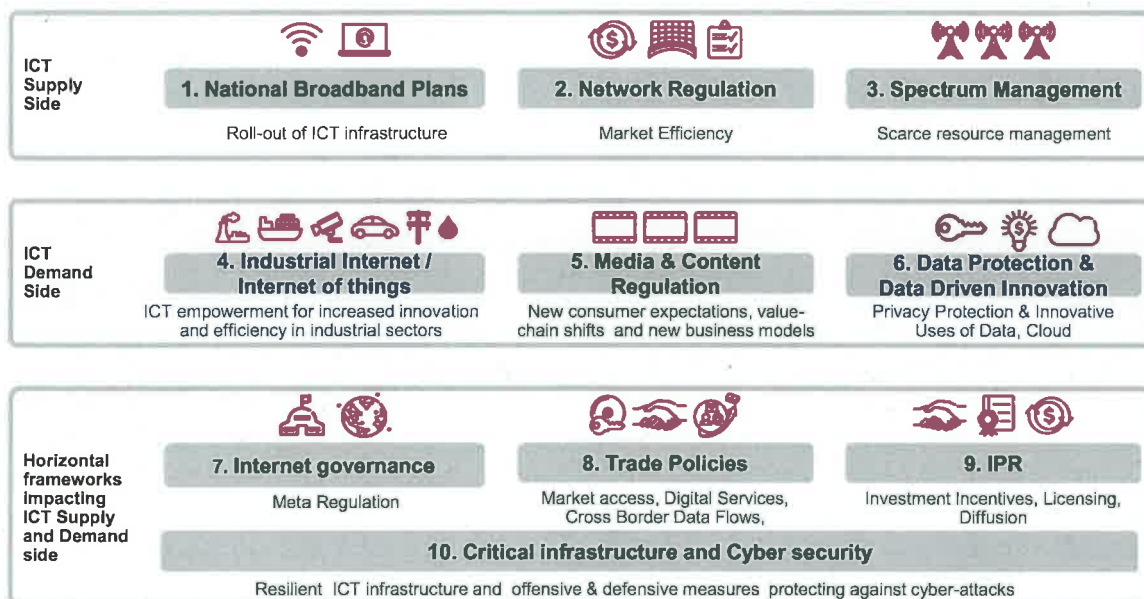|			
ICT Supply Side	**1. National Broadband Plans** Roll-out of ICT infrastructure	**2. Network Regulation** Market Efficiency	**3. Spectrum Management** Scarce resource management
ICT Demand Side	**4. Industrial Internet / Internet of things** ICT empowerment for increased innovation and efficiency in industrial sectors	**5. Media & Content Regulation** New consumer expectations, value-chain shifts and new business models	**6. Data Protection & Data Driven Innovation** Privacy Protection & Innovative Uses of Data, Cloud
Horizontal frameworks impacting ICT Supply and Demand side	**7. Internet governance** Meta Regulation	**8. Trade Policies** Market access, Digital Services, Cross Border Data Flows,	**9. IPR** Investment Incentives, Licensing, Diffusion
	10. Critical infrastructure and Cyber security Resilient ICT infrastructure and offensive & defensive measures protecting against cyber-attacks		

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DEVELOPING HIGH QUALITY BROADBAND AND IT INFRASTRUCTURE

> Developing, formulating and implementing national broadband plans
>> Supply side policies
>> Demand side policies
> Sustainable policy response to key ICT policy issues
>> Sector regulation
> Integrating national broadband plans with national digital economy strategies
>> Natural component in the national digital transformation agenda

DISCUSSION

› Do you have an active public policy/strategy to pursue digital transformation? Is it integrated into overall country development strategy?

› How is your country addressing the key success factors: vision &buy-in, leadership & institutions, policy & regulation, BB infrastructure & connectivity?

› How is transformation pursued at the sector levels and integrated with CSF strategies?

› What lessons can we take from your country's transformation journey?

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ERICSSON

The Swedish approach for continued improvements in mobile broadband coverage and capacity

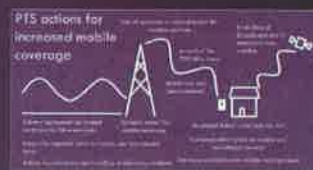Jonas Wessel, Director Spectrum Department

Swedish Post and Telecom Authority (PTS)

PTS   Swedish Post and Telecom Authority
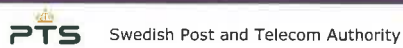
Tools for enabling market developments

- Spectrum
- Strategy
- Organisation
- Awards & Regulation
- "Soft" measures

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Spectrum is a finite good

- Need for existing and legacy demands
- Need for new demands
- Reasonable interference situation
- A few other aspects
  - Harmonisation, competition, socieltal development, etc.

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Sweden

FREQUENCY ALLOCATIONS

THE RADIO SPECTRUM
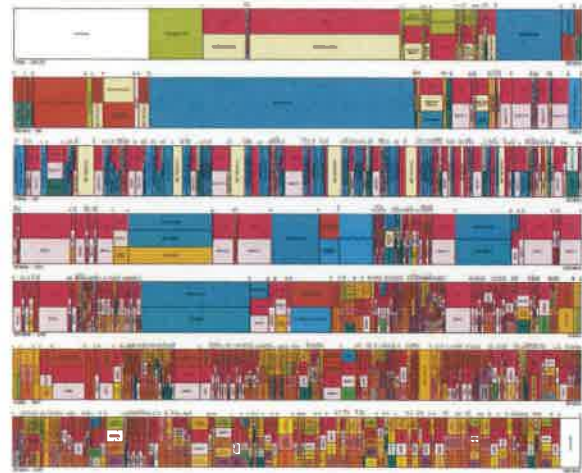
The challenge…

- 365 400 TB (+35% YoY)
- 33% of data traffic from smartphones
- Average per type of sub/month
  - Standalone service 8,9 GB (+27%)
  - Addon 1,7 GB (+28%)
  - "Without" broadband 0,3 GB (+44%)
- 106 MB / pop / day

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Mobile population and area coverage

	Voice	Data (3G+4G)	Handheld outdoor	Pop	Area
			Voice	>99,9%	83%
			10 MBps	99%	48%
			30 MBps	60%	1%

Source: PTS, Operator coverage maps,
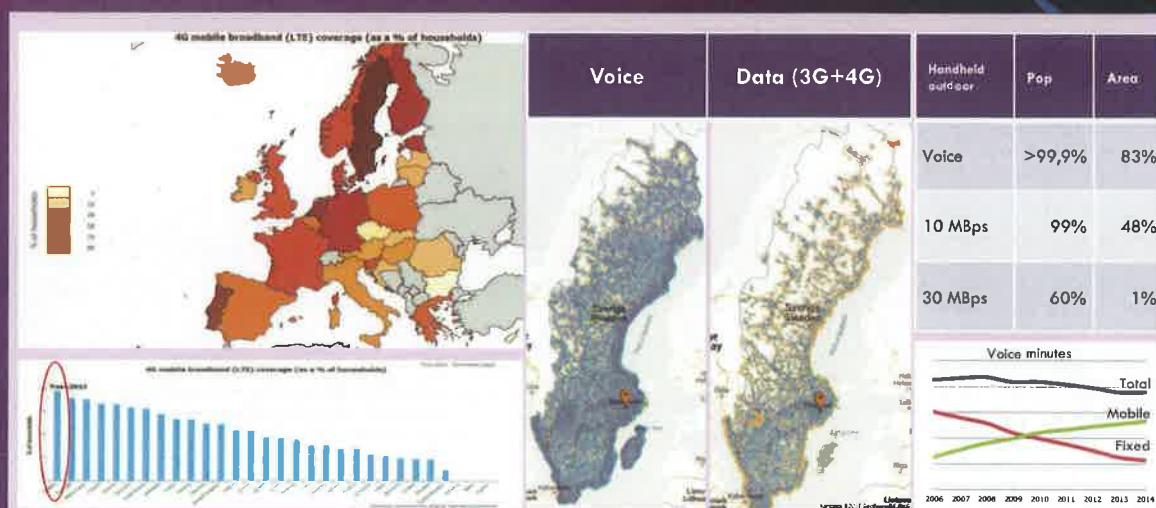European Commission, Digital Agenda Scoreboard 2014

Market trends in Sweden

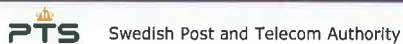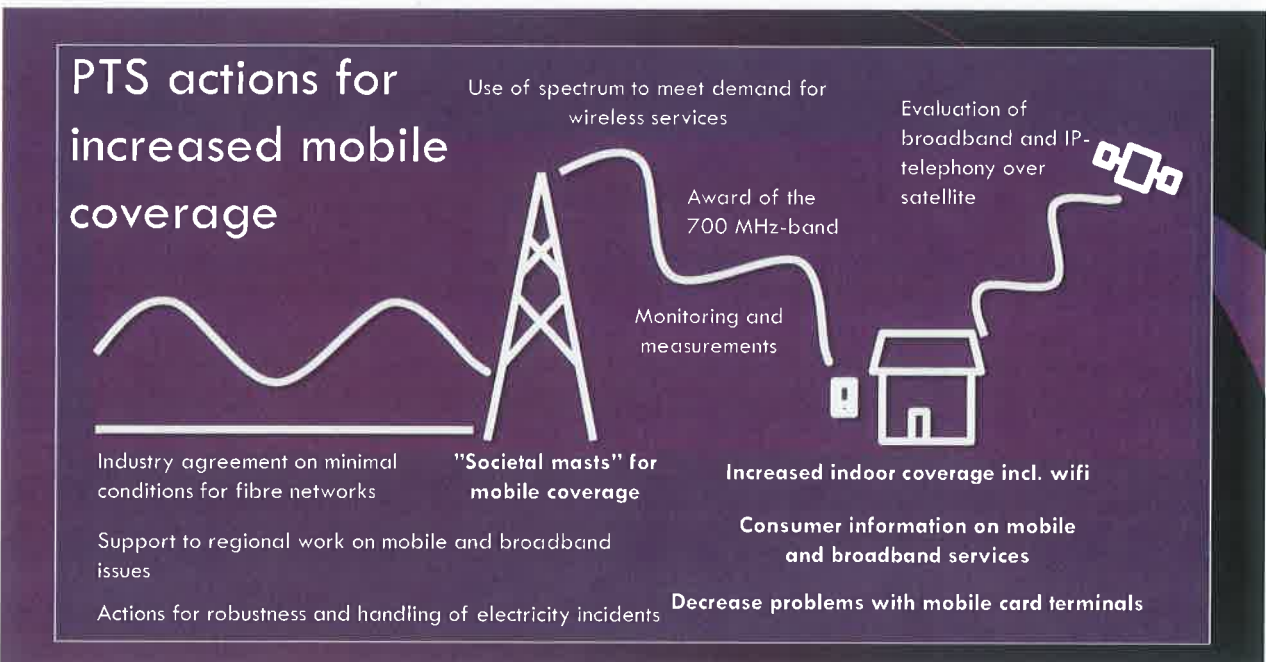- Mobile first – mobile is the first choice for accessing broadband services

- Rapidly changing consumer behaviour
  - Mobile internet access increasing dramatically
  - Fixed telephony declining (66% outgoing traffic is mobile)
  - Societal dependency on electronic communication and services increasing
  - Access everywhere on every device

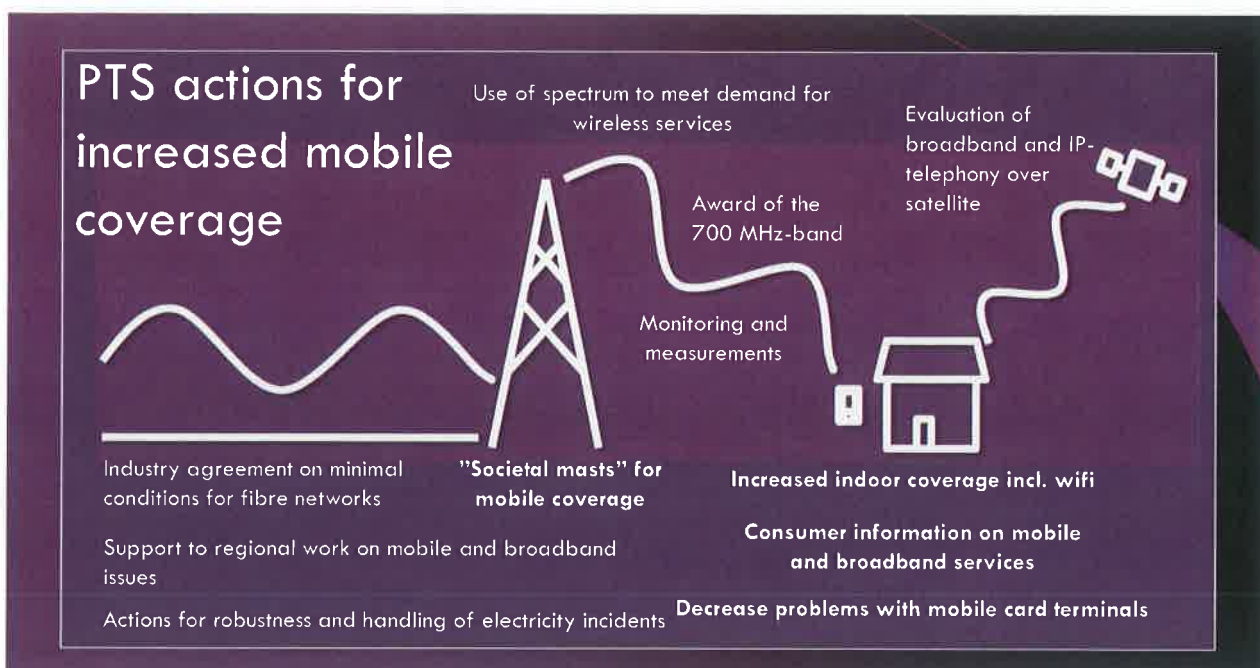- Coverage and capacity is becoming a necessity of life

The Spectrum department consists of four sections in line with our overall process

SPECTRUM DEPARTMENT

SPECTRUM ANALYSIS

Socioeconomic benefits

Spectrum demand and supply, needs and availability

Long term spectrum planning

SPECTRUM DEVELOPMENT

Development of technical license conditions

International coordination

Legal

Harmonisation

SPECTRUM LICENSING

Award process (analysis of applications, planning, award, changes etc.)

Auctions and individual licenses

Efficient award process

End-user simplification

SPECTRUM SUPERVISION

Supervision of license conditions

Interference resolution

Equipment issues

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PTS actions for increased mobile coverage

Use of spectrum to meet demand for wireless services

Evaluation of broadband and IP-telephony over satellite

Award of the 700 MHz-band

Monitoring and measurements

Industry agreement on minimal conditions for fibre networks

"Societal masts" for mobile coverage

Increased indoor coverage incl. wifi

Support to regional work on mobile and broadband issues

Consumer information on mobile and broadband services

Actions for robustness and handling of electricity incidents

Decrease problems with mobile card terminals

PTS   Swedish Post and Telecom Authority

PTS actions for increased mobile coverage

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PTS Swedish Post and Telecom Authority

The Swedish spectrum strategy in theory and practice

Ylva Mälarstig, Head of Spectrum Analysis section

Swedish Post and Telecom Authority (PTS)

PTS Swedish Post and Telecom Authority

PTS' Goals

- Everyone should have access to good telephony, broadband and postal services

- Efficient utilisation of limited resources, such as frequencies and numbers

- Functioning competition in the market, resulting in a good range of options and low prices for consumers

- Networks and services are reliable and secure.

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10 Auctions to date in Sweden

•	2005	450 MHz	SRSB
•	2007	3.6-3.8 GHz	SMRA with switching
•	2008	2.6 GHz	SMRA with switching
•	2008	1900-1905 MHz	SRSB
•	2009	3.6-3.8 GHz	Combinatorial SRSB
•	2009	28 GHz	Combinatorial Clock
•	2011	800 MHz	SMRA with switching
•	2011	1800 MHz	Clock auction + SRSB
•	2011	3.5 GHz	SRSB
•	2011	10.5 GHz	Combinatorial SRSB

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Sweden

FREQUENCY
ALLOCATIONS

THE RADIO SPECTRUM

Challenges
- Radio spectrum is a scarce resource
- Increased demand for wireless services and spectrum
- Allocation a result of historic priorities
- Technical development – but will not solve all problems

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Spectrum Strategy - for long term and transparent spectrum management

Make spectrum available

Use spectrum efficiently

Maximise the economic benefit of spectrum for society

Give the market better chances to fulfill the increasing demand for wireless services

Meet the needs of society

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Main elements in the Swedish Spectrum strategy

PTS   Swedish Post and Telecom Authority

Spectrum efficiency is socio-economic efficiency

The optimal distribution of resources in society, that creates maximum welfare, taking into account all external and internal costs and benefits.

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Spectrum efficiency
is socio-economic efficiency

- Value of alternative use(s)
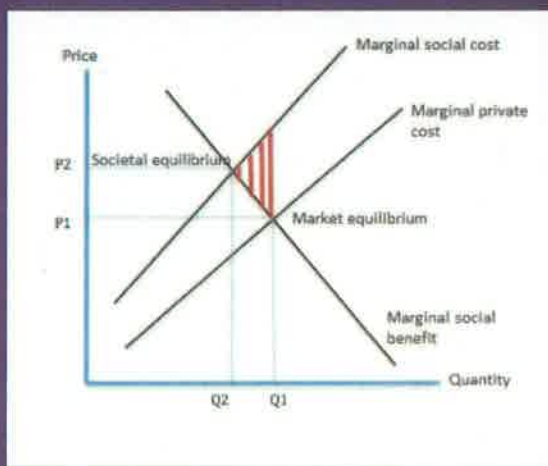
- Producer and consumer surplus

- Includes cost of migration/new equipment etc

- Willingness to pay a good approximation where there is a market

The optimal distribution of resources in society, that creates maximum welfare, taking into account all external and internal costs and benefits.

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Spectrum efficiency
is socio-economic efficiency
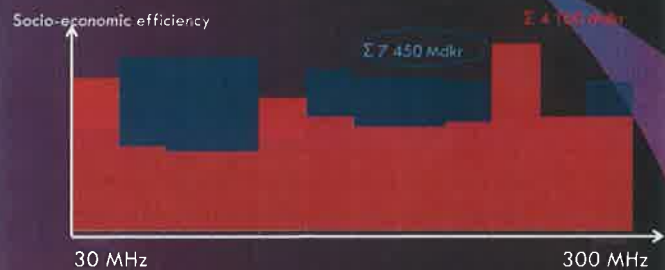
Socio-economic efficiency must be seen over a long time, over all spectrum.

In the very long term – all spectrum uses should operate in the most socio-economic suitable frequency band.

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Enable the wireless future through sufficient availability of spectrum

- Least restrictive conditions, new international harmonisation
- Timely awards to meet demand
- Second hand trading and leasing
- Higher (economic) efficiency of spectrum use through efficient technical conditions, tighter radio planning, defining presumptions for receiver integrity etc.
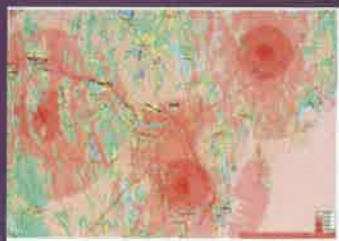
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Enable a diversity of spectrum uses

Measures should be future proof and work in different future scenarios.

- Few restrictive conditions, and offering different types of usage rights and conditions of use.

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Promote the sharing of all spectrum in the long term

- No exclusive licenses.

- Protection from interference through appropriate sharing conditions.

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Promote broad international harmonisation with as few restrictive conditions as possible

- Maximise the opportunities for efficient spectrum use and minimise negative restrictions.

- A minimum of restrictive conditions (only those required to facilitate efficient spectrum use) enables uses with maximum societal benefits.

- Broad harmonisation will include as many countries as possible.

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Assignment of spectrum

- Market based approach treating spectrum as a commodity

but

- socio-economic analysis when market mechanisms aren't sufficient meeting societal needs.

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Efficient use of resources = socio-economic efficiency

Inventory of needs and spectrum use → Identify spectrum for revision → Evaluating alternative use, cost-benefit analysis of what uses to enable

Market mechanisms works

Market lacking

Assignment

Auctions etc.

Needs assessment

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A continuous process

Spectrum strategy:
• Inventory of spectrum usage today and in 2022

• Principles and tools to optimize the public welfare

• Efficient instruments for spectrum management

• Efficient technical rules for licenses (sharing)

Inventory phase
Supply, demand, Current use

PTS Orientation plan

Analysis phase
Review of frequency bands and evaluation of current/ potential usage

Implementation phase
Renewal or phase out of current use
License conditions
Assignment design choices
Assignment

Case: the 700 MHz band

Government Decision of 27 February 2014

• 700 MHz band to be released for "services other than broadcasting" from April 1, 2017

• Terrestrial TV broadcast to use Band III (174–230 MHz) and remaining part of Band IV/V (470–694 MHz) after 1 April 2017

Case: 700 MHz band

- PTS pre-study, inventory of needs and socio-economic analysis of which uses should be enabled
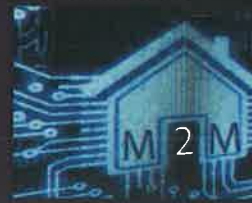
Mobile broadband

Mobile broadband
Exclusive net for PPDR

Wireless microphones

Machine to machine communications

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Conclusions in the pre-study 700 MHz

- Recommends to proceed with an auction - band plan should enable commercial mobile broadband.

- Currently not enough justification to dedicate frequencies in the 700 MHz band for PPDR in Sweden.

- The needs of frequencies for wireless microphones can be met without frequencies in the 700 MHz band.

- PTS will be able to ensure proper protection of terrestrial television below 694 MHz.

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Alternatives studied

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700 MHz band

- The European harmonised band plan (ECC/CEPT) allows for 2*30 MHz FDD and up to 20 MHz SDL/DL.

Figure 1: Channelling arrangement for MFCN in the 700 MHz band: FDD 2x30MHz and Supplemental Downlink (SDL) option in the duplex gap

(A) SDL option: There are alternative options being considered in CEPT (see description in section 1b below). "The zero up to four blocks of 5 MHz approach" provides flexibility for combining different options.

b. Alternative options for PMSE, PPDR, M2M and other services on a national basis within the given channelling arrangement for MFCN in the 700 MHz band including FDD (2x30 MHz)

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Upcoming awards in Sweden

- 700 MHz   Spectrum available from April 1st 2017
- 450 MHz   Current license expires 2020
- 1800   License (2x5 MHz) expires 2017
- 1.5 GHz   Pre-study 2015
- 2.3 GHz   Harmonisation ongoing
- 3.5 GHz   Licenses expiring 2017-

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Questions?

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+46 8-678 58 55

Icy mobile mast on top of mountain "Åreskutan" in northern Sweden.

PTS   Swedish Post and Telecom Authority