Networks "Fit for Purpose" Tipping Point for IPv6?

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23 February 2010

Agenda

- What's changed in a year?
- Internet of Things is becoming real
- Mobile as a driver
- Networks "Fit for Purpose"
- IPv6 at the tipping point

My Conclusion Last Year:
Need to Create an Ecosystem for IPv6

- Network architecture and capability necessary but not sufficient

- Capable devices

- Demand creating applications

- Dual stacks for indefinite interoperability transition

- Creating the 'virtuous cycle' feedback loop

- Need business case to deploy/adopt

What's Changed?
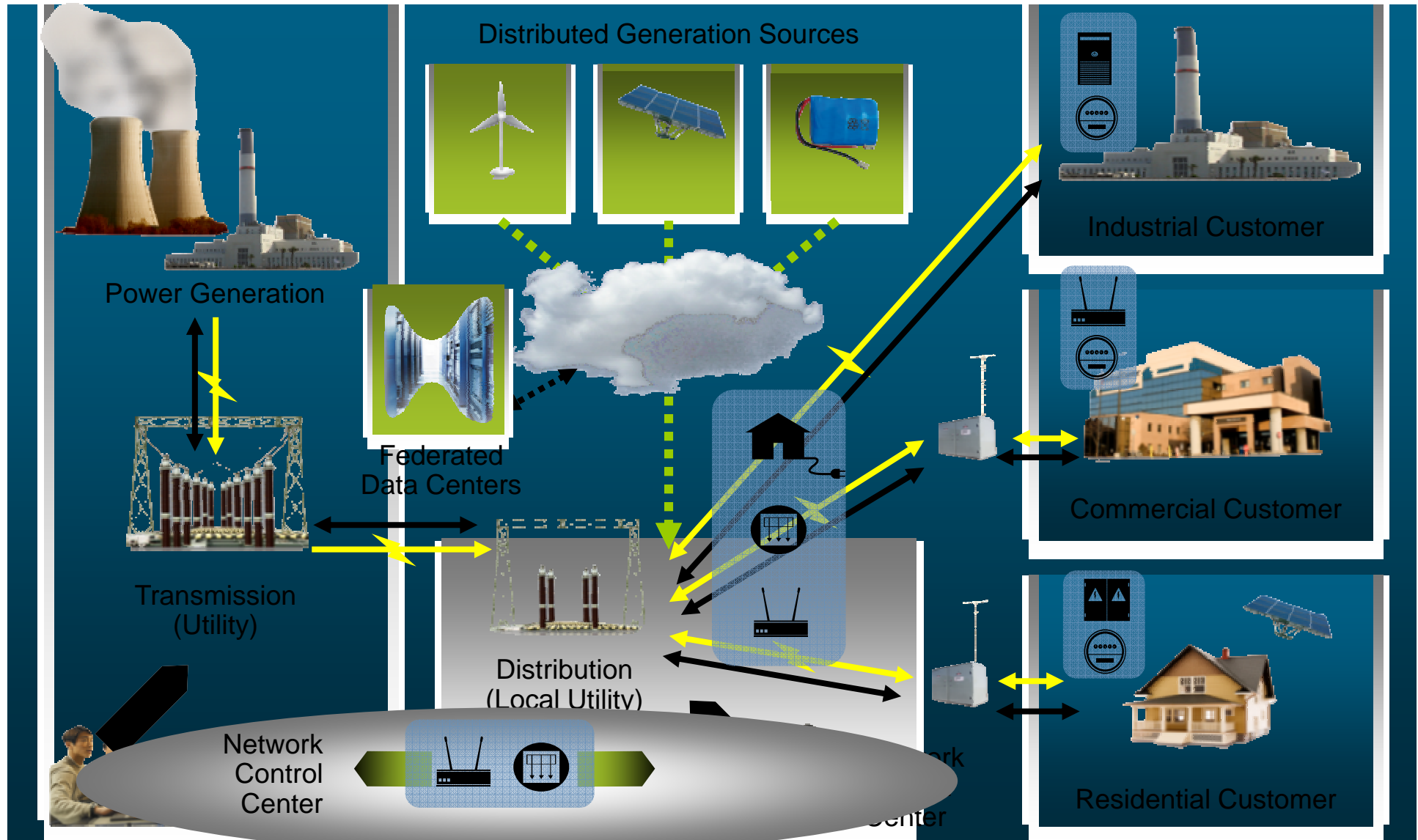# The Internet of Things is Becoming Real

What's Changed in One Year?

- Theory becoming reality

- Smart Grid

- Smart buildings

- Sensor networks

- Wireless networks for devices, not just people

- Intelligent Transportation Systems

- Cloud and data centers

- Real bottom-up business case emerging

Smart Grid—Communicating for Management
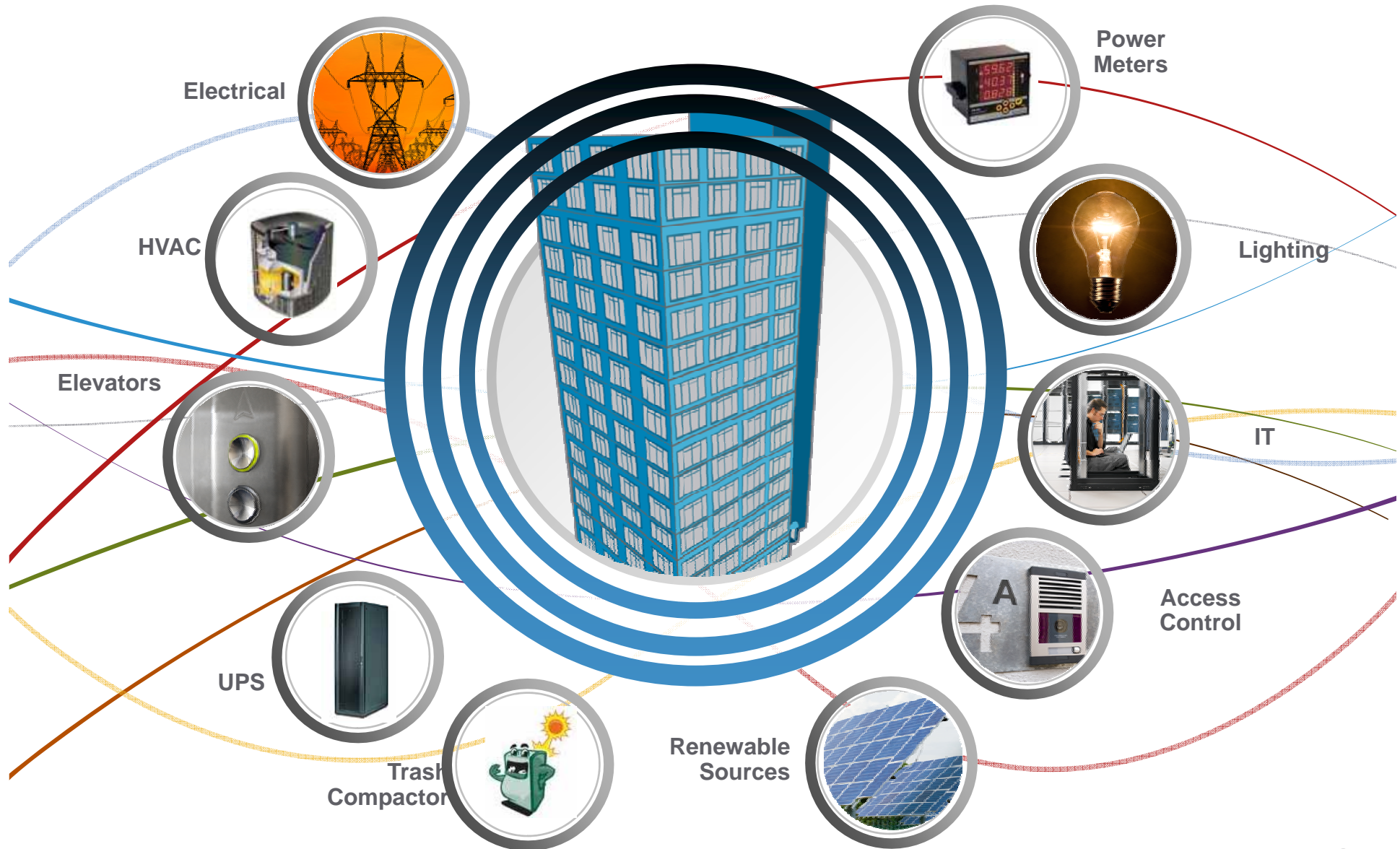

Energy → | ← Information

Distributed Generation Sources

Power Generation

Federated Data Centers

Transmission (Utility)

Distribution (Local Utility)

Network Control Center

Industrial Customer

Commercial Customer

Residential Customer

"Commercial buildings waste up to one-third of all energy they consume."

The Problem
Today's Disparate Building Systems

Electrical

HVAC

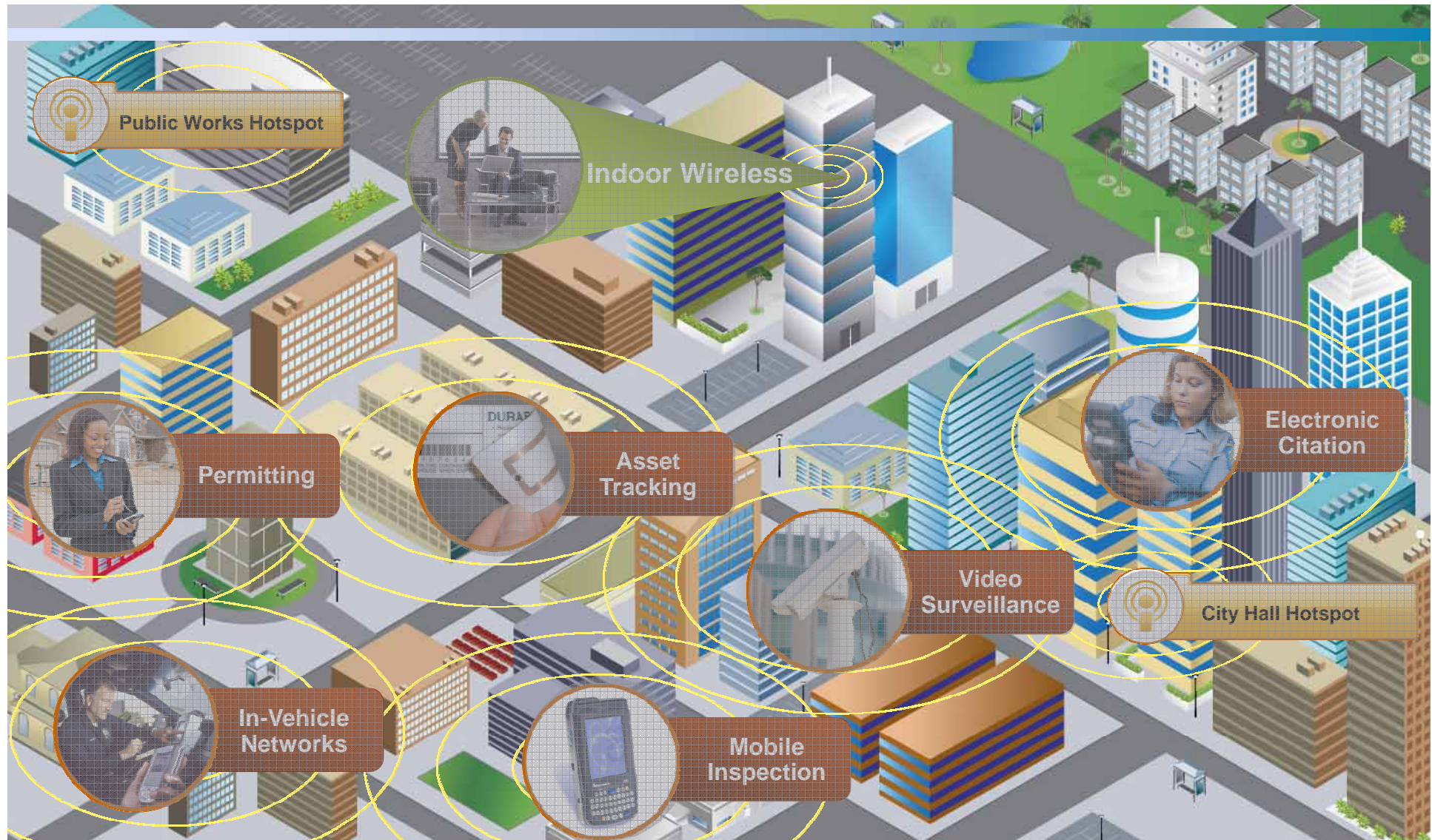Elevators

UPS

Trash Compactor

Renewable Sources

Power Meters

Lighting

IT

Access Control

Solution: Sustainable Energy Management
Smart Buildings converging to an Energy Intranet

Power

Lighting

HVAC

Power Meter

Elevators

IT

UPS

Access Control

Trash Compactor

Renewable Sources

Governments Connecting for Efficiency, Cost Savings and Better Service

Mobile Driving Towards an Exabyte World
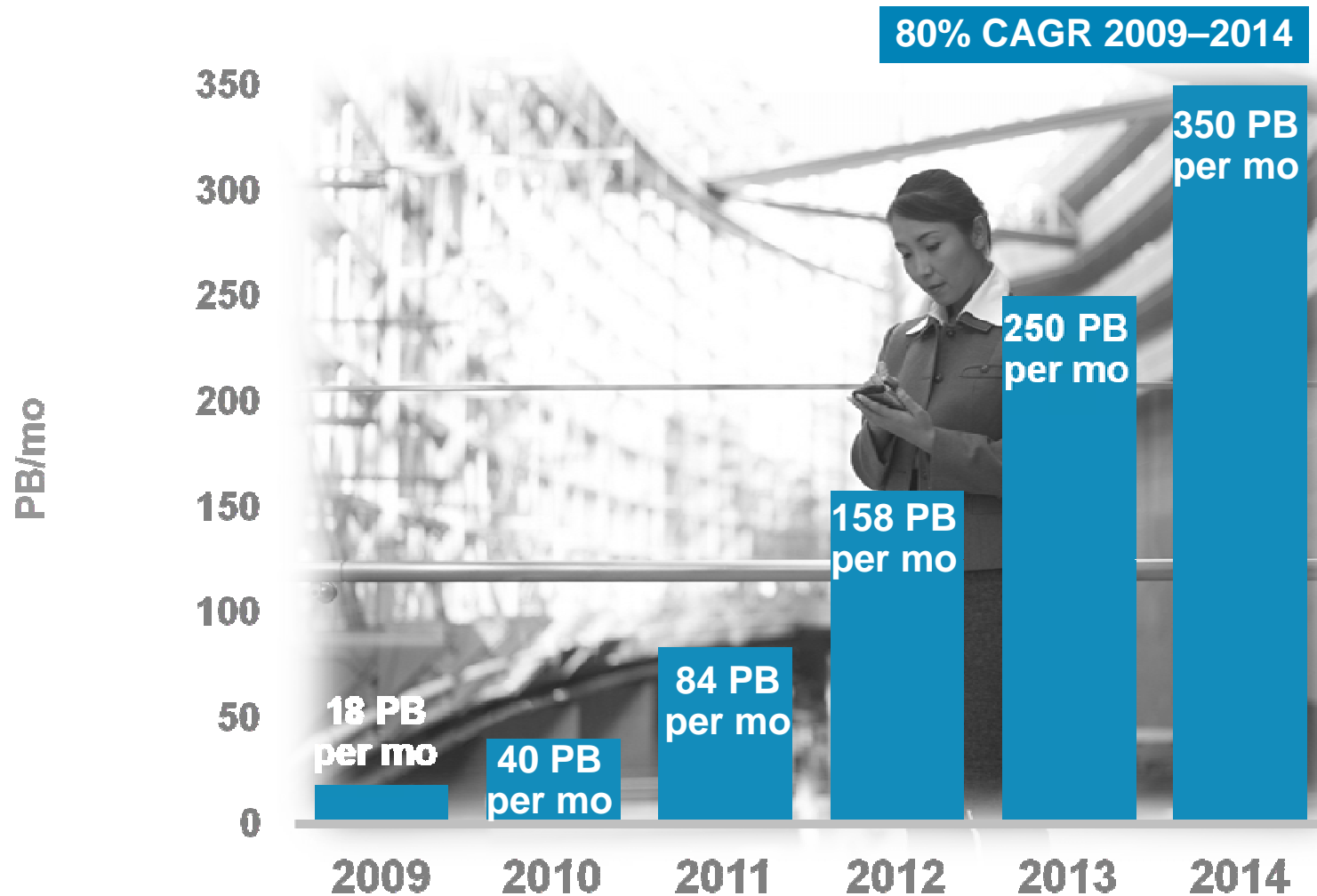
Visual Networking Devices

Driving Mobile Data Growth – 2010 Mobile Device Comparisons

E-reader = **2 X** (monthly basic mobile phone data traffic)

Smartphone = **10 X** (monthly basic mobile phone data traffic)

Digital Photo Frame = **10 X** (monthly basic mobile phone data traffic)

Video Camera = **100 X** (monthly basic mobile phone data traffic)

Mobile Phone Projector = **300 X** (monthly basic mobile phone data traffic)

Laptop = **1,300 X** (monthly basic mobile phone data traffic)

Source: Cisco Visual Networking Index (VNI) Global Mobile Data Forecast, 2009–2014

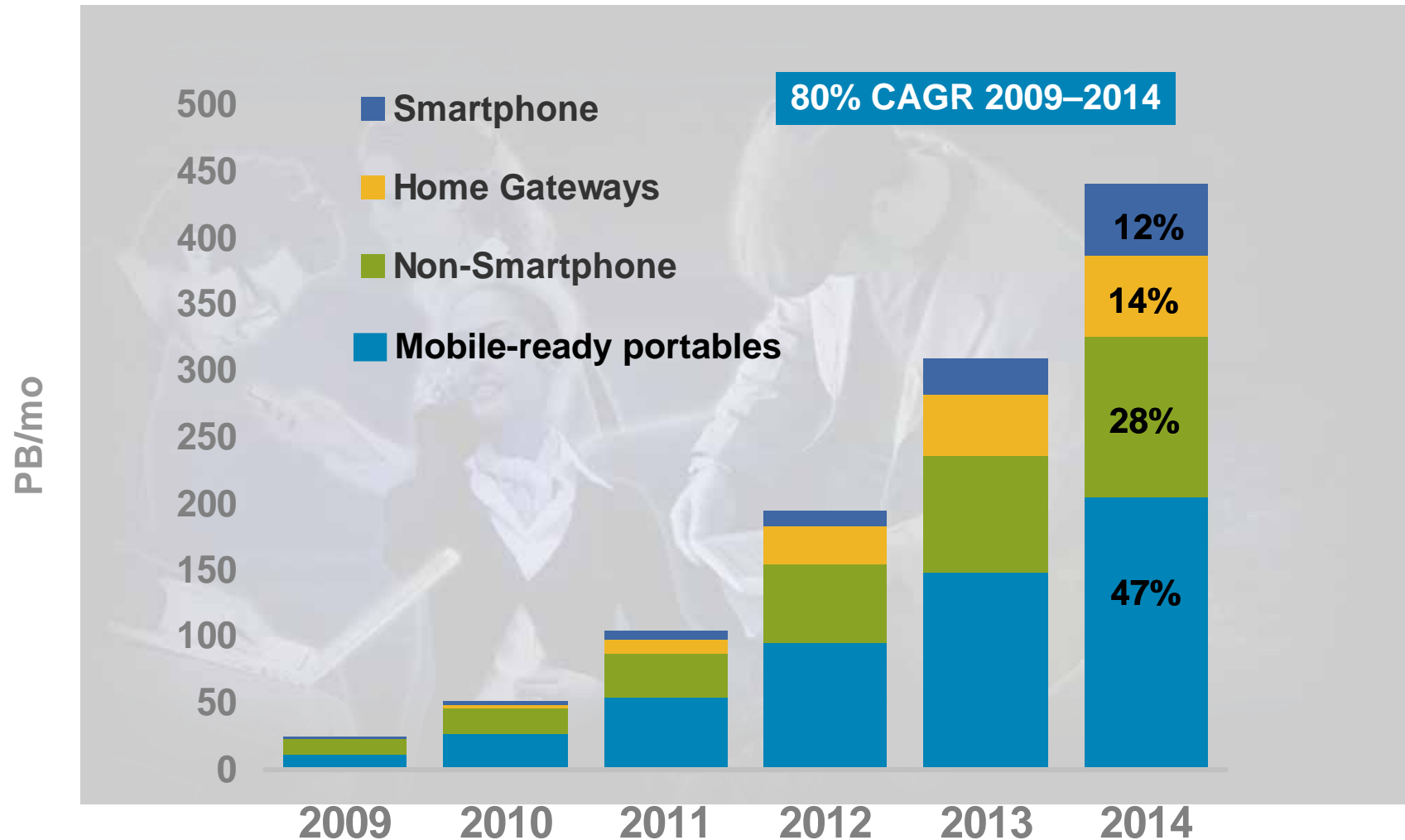# Japan Mobile Data Traffic Growth / Top-Line
Mobile data traffic will increase 19X from 2009 to 2014

80% CAGR 2009–2014

350 PB per mo (2014)
250 PB per mo (2013)
158 PB per mo (2012)
84 PB per mo (2011)
40 PB per mo (2010)
18 PB per mo (2009)

PB/mo

Source: Cisco Visual Networking Index (VNI) Global Mobile Data Forecast, 2009–2014

Japan Mobile Data Traffic Growth / Devices
Mobile-ready portables -- 50% of mobile data traffic by 2014

80% CAGR 2009–2014

Legend:
- Smartphone
- Home Gateways
- Non-Smartphone
- **Mobile-ready portables**

PB/mo

2014 bar labels: 12%, 14%, 28%, 47%

Y-axis: 0, 50, 100, 150, 200, 250, 300, 350, 400, 450, 500

X-axis: 2009, 2010, 2011, 2012, 2013, 2014

Source: Cisco Visual Networking Index (VNI) Global Mobile Data Forecast, 2009–2014

Data and Media are Driving Japan's Mobile Internet

- In Japan…

- Annual mobile data traffic in 2014 (350 Petabytes) will be 19X more than 2009

- Mobile data traffic is growing 2x faster than fixed data

- By 2014, each laptop will generate 7 GB of mobile data/month vs. 1.6 GB/month in 2009

- Today, a handset generates 58 MB/month, in 2014, a handset will generate 781 MB/month

- A laptop on the mobile Internet generates 27X more data traffic than a handset

- 548,000 hours of music are streamed to handsets each day

- 496,000 hours of video are streamed to handsets each day

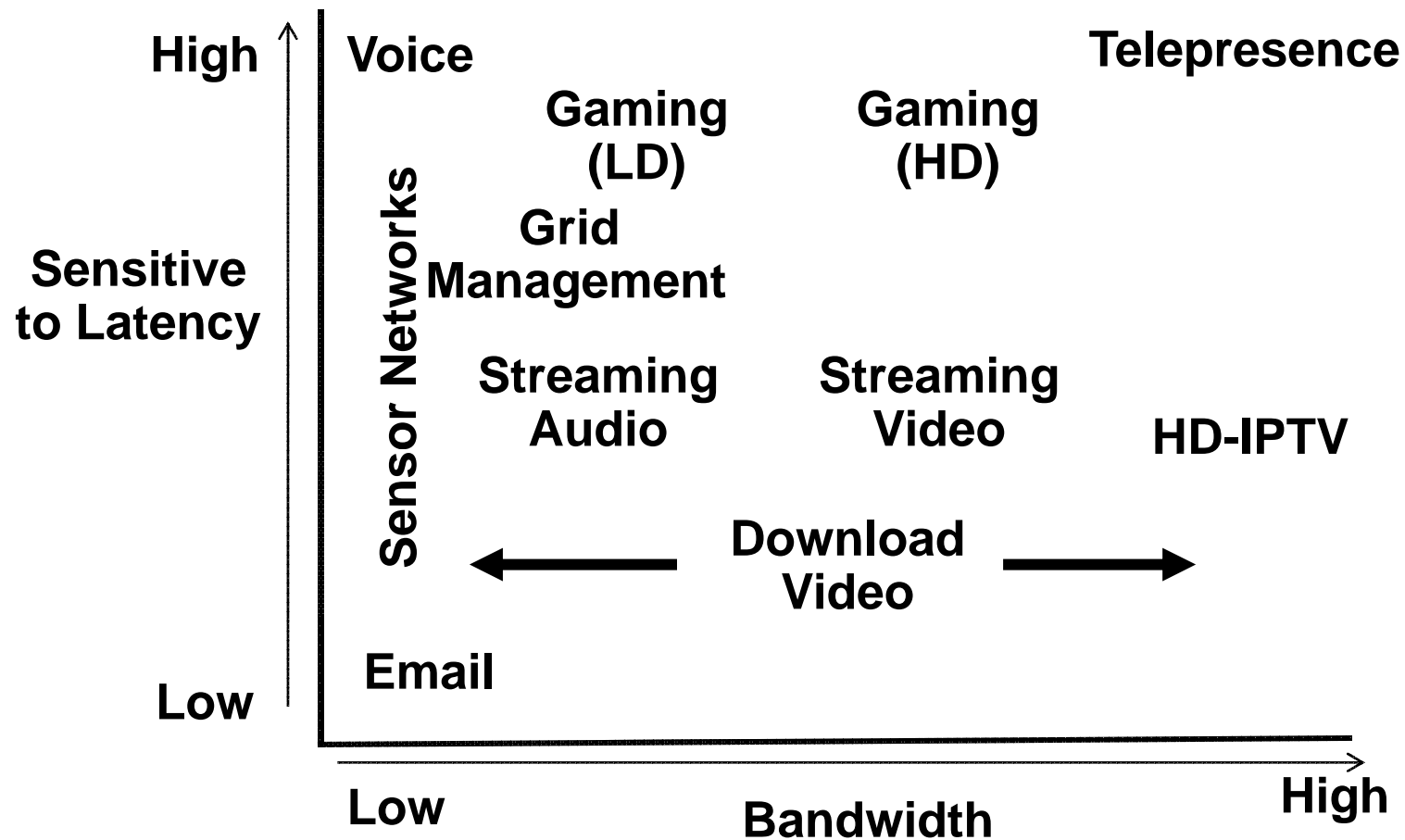Source: Cisco Visual Networking Index (VNI) Global Mobile Data Forecast, 2009–2014

Networks
"Fit for Purpose"

Dimensions of Broadband Networks

- **Bandwidth—"speed"**
- **Latency**
- **Jitter**
- **Symmetry**
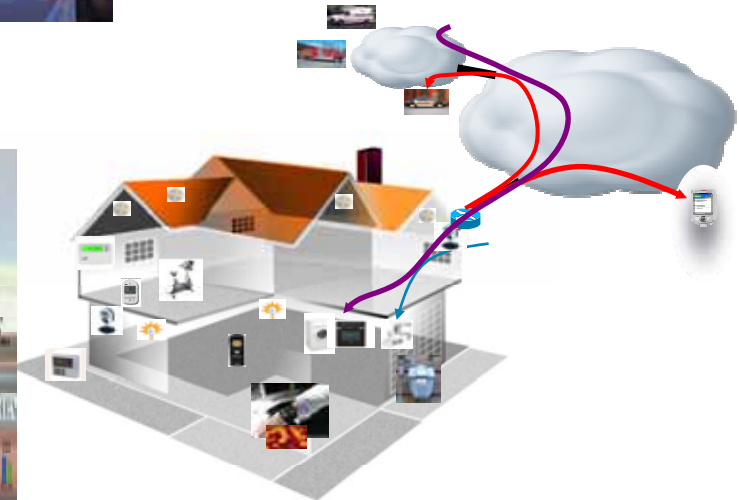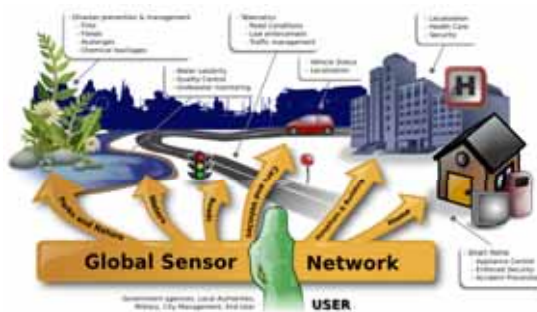- **Bursting**
- **Mobility**
- **Other…**

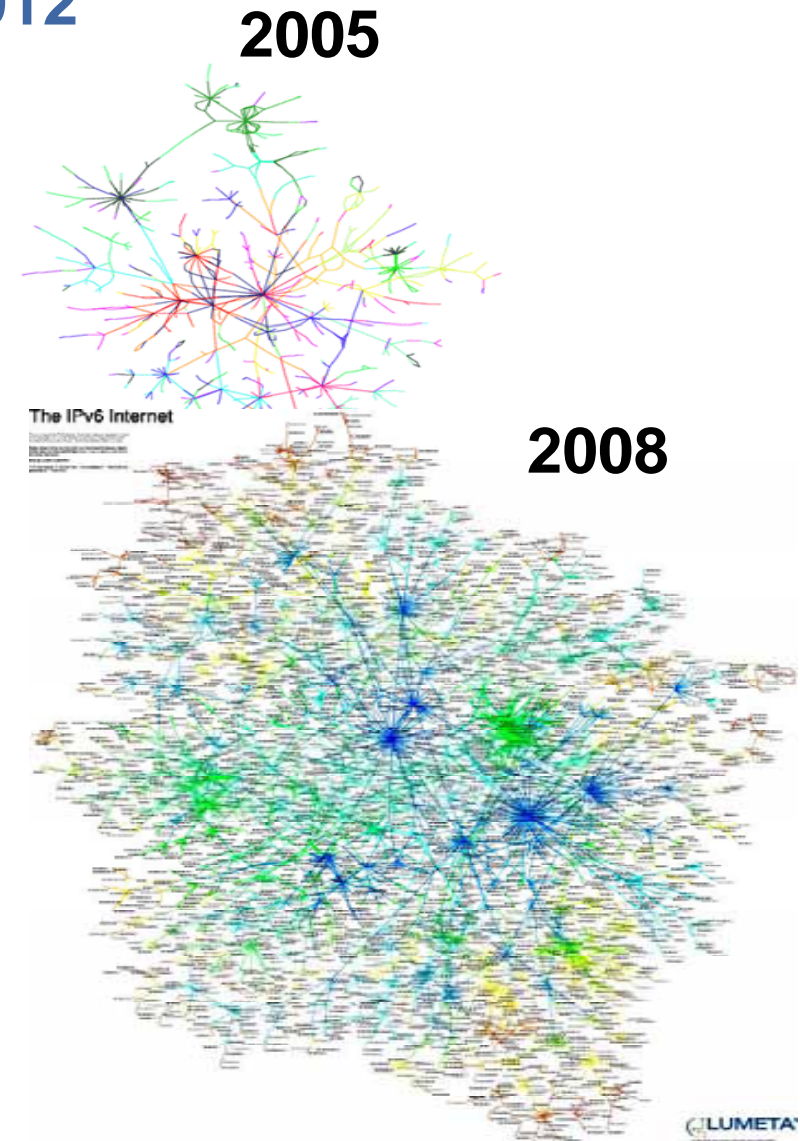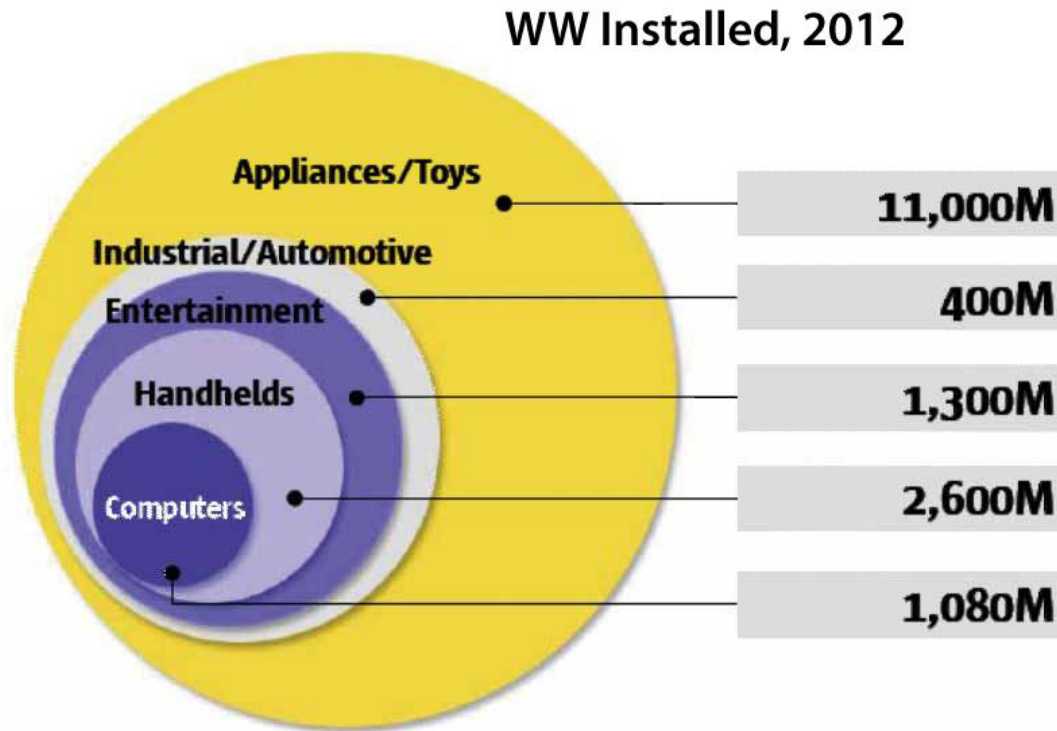# Matching Applications to Networks "Fit for Purpose"
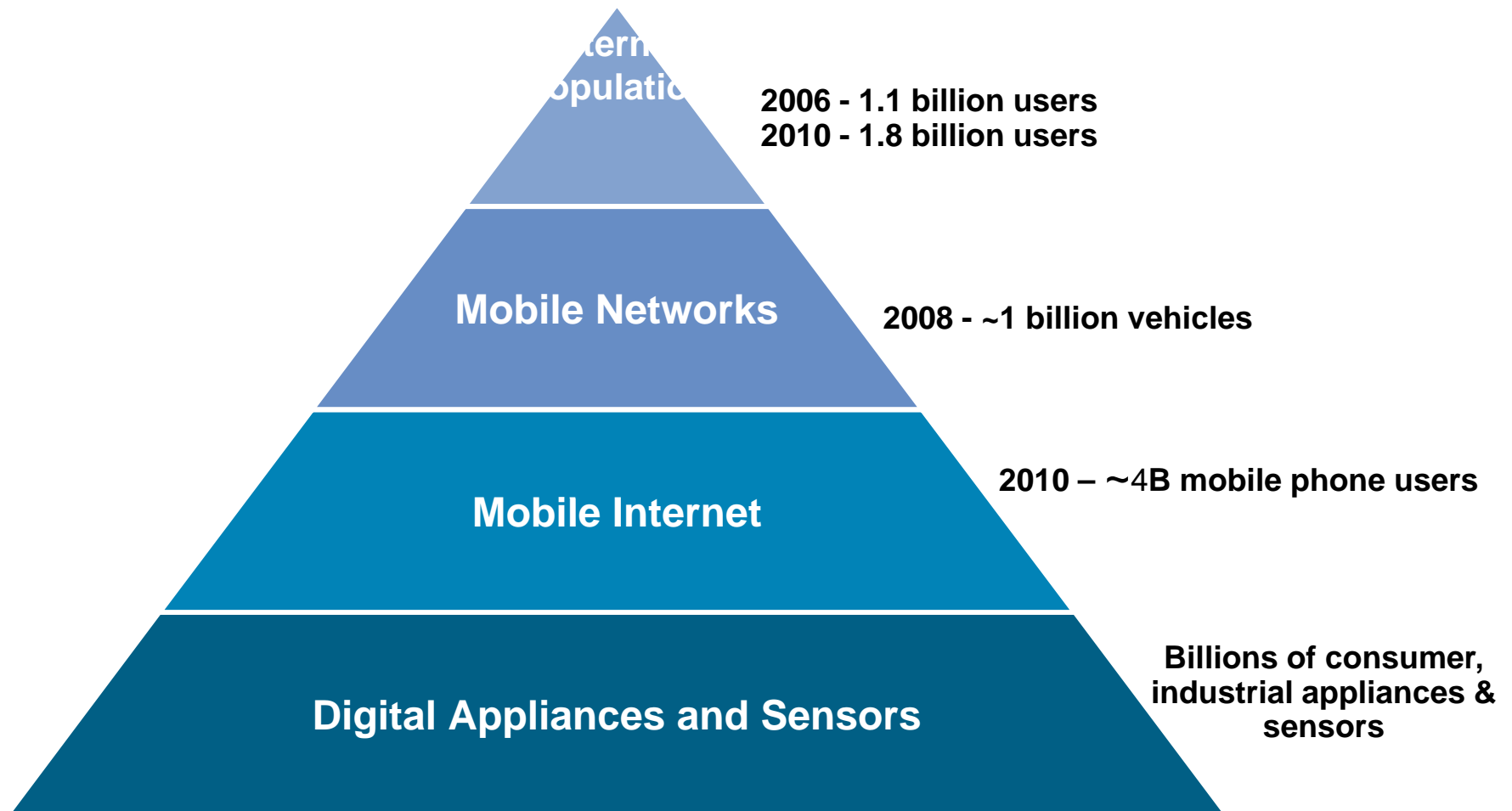
IPv6 at the Tipping Point

Connecting more things!

Evolution of the Internet

17 Billion Devices 2012

2005

WW Installed, 2012

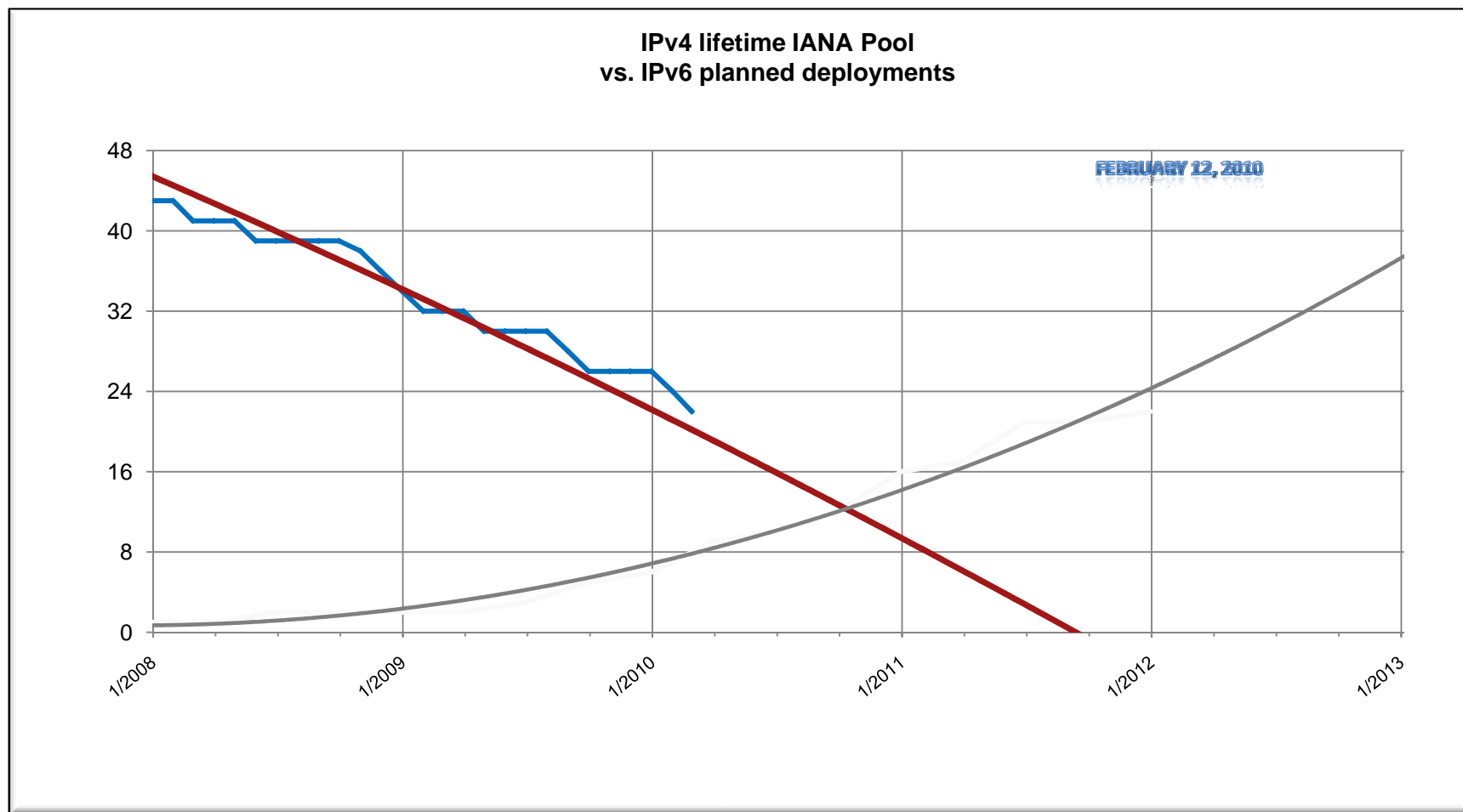|	
Appliances/Toys	11,000M
Industrial/Automotive	400M
Entertainment	
Handhelds	1,300M
Computers	2,600M
	1,080M

The IPv6 Internet

2008

50 billion devices by 2015
One *trillion* communicating
devices by 2020?

As Global Demand for Networked People, Resources and Devices Grows, Resource Needs Grow

Internet Population

Mobile Networks

Mobile Internet

Digital Appliances and Sensors

2006 - 1.1 billion users
2010 - 1.8 billion users

2008 - ~1 billion vehicles

2010 – ~4B mobile phone users

Billions of consumer, industrial appliances & sensors

4.28B = IPv4 physical address space

Towards 50 Billion Connected Devices
Depletion vs. Uptake

**IPv4 lifetime IANA Pool
vs. IPv6 planned deployments**

FEBRUARY 12, 2010

IPv6 at the Tipping Point

% Adoption

Or The Internet Economy!

False Start ?
Lost Opportunities
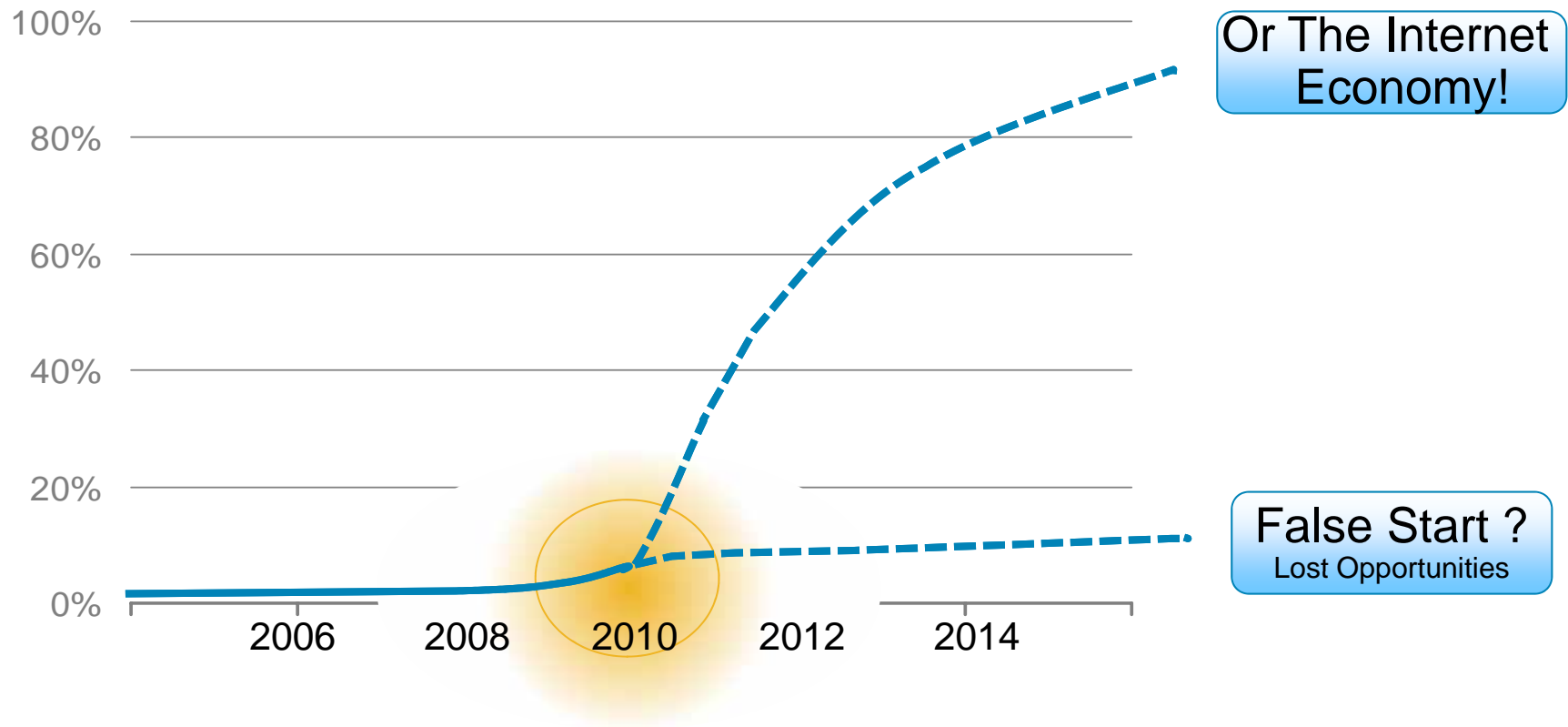
Conclusions This Year

- Network architecture and capability necessary but not sufficient

- There are capable devices

- There are demand creating applications

- Dual stacks for indefinite interoperability transition are being deployed

- An ecosystem is being created for IPv6

- Number exhaust is no longer theoretical and off in future

- There is a business case to deploy/adopt

- 2010/2011 will be the tipping point for IPv6