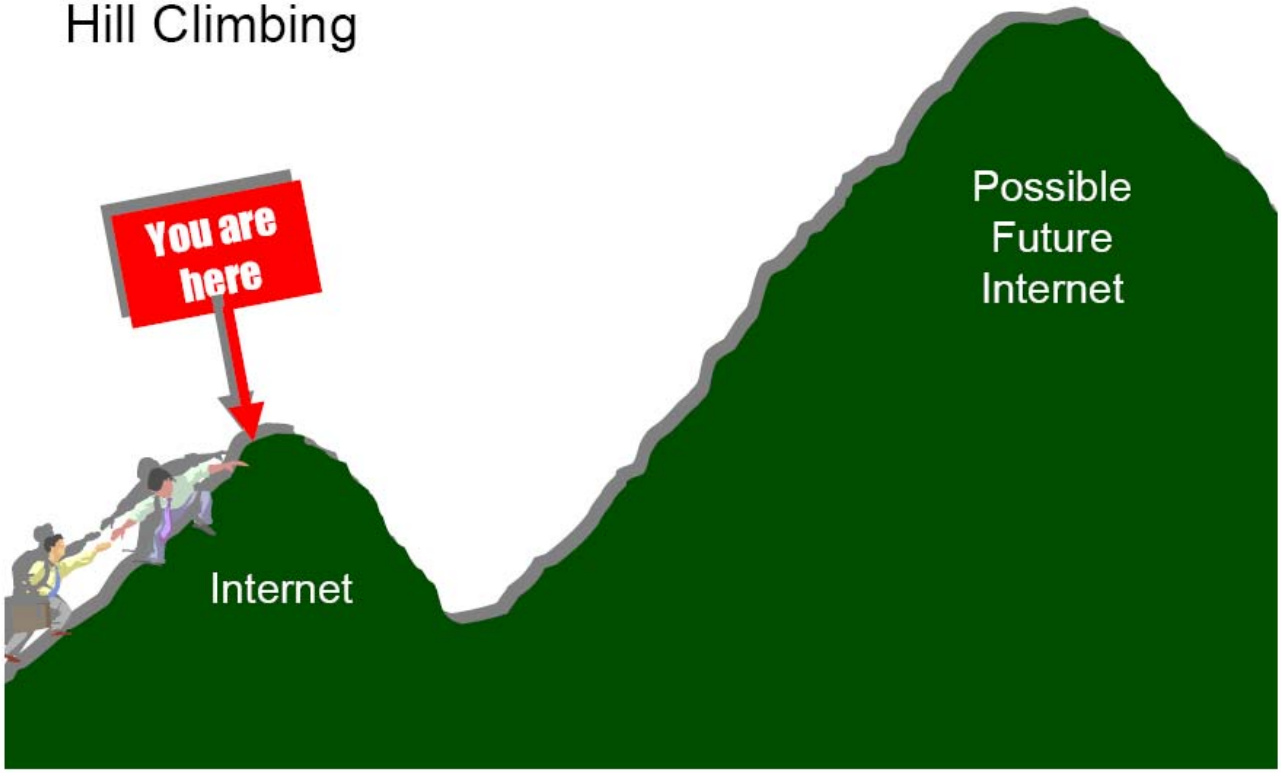

IPv6
The Two-Way Internet
Future Internet
To IP or Not to IP
FORUM
Vision & Way Forward


AGENDA
CASE
STUDY
V4
ISP
BIZ
GOV
911
FORUM
Vision & Way Forward

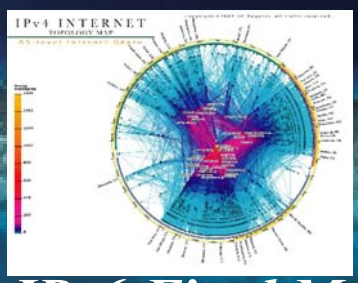
It takes Passion & Patience !

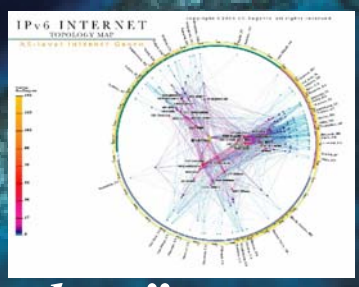
Hill Climbing



Perception: IPv4 is Innovation - IPv6: an Upgrade

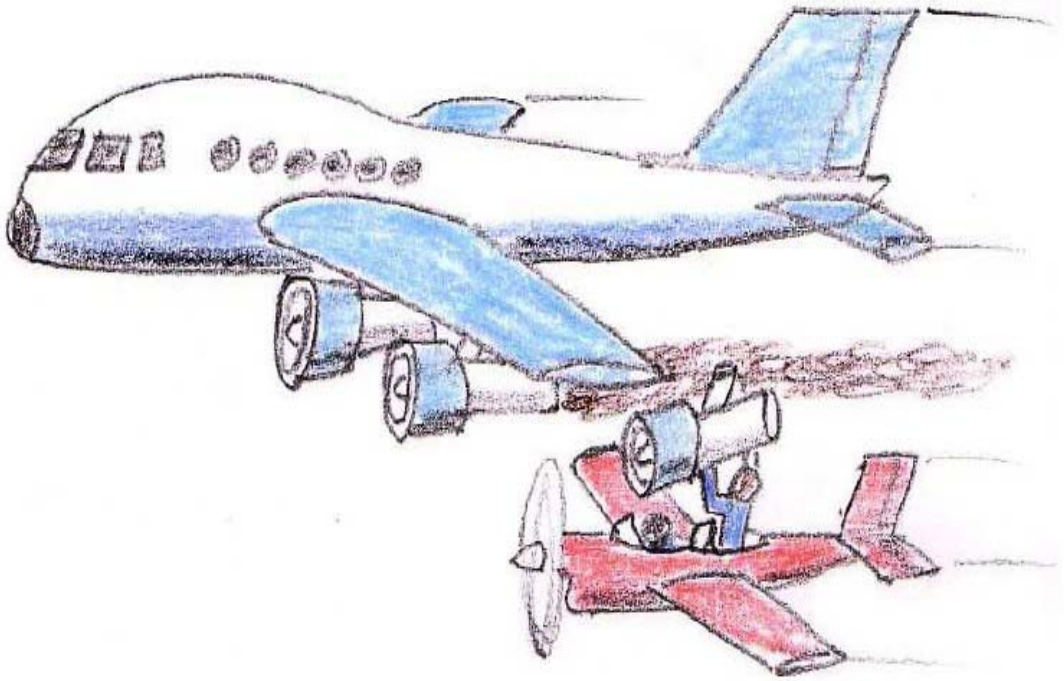
	Yv4	Yv6	
Political Goodwill	Not needed	Needed?	★
Business Drivers	Innovation	Upgrade	✹
Technology Value	Powerful	Same & More	★
Infrastructure			✹





Evolving the Internet Architecture:

Changing the Engines in Mid-Flight



WORLD INTERNET USAGE & POPULATION STATISTICS

World Regions	Population (2007 Est.)	Population % of World	Internet Usage, Latest Data	% Population (Penetration)	Usage % of World	Usage Growth 2000-2007
Africa	933,448,292	14.2 %	**43,995,700**	4.7 %	3.5 %	874.6 %
Asia	3,712,527,624	56.5 %	**459,476,825**	12.4 %	36.9 %	302.0 %
Europe	809,624,686	12.3 %	**337,878,613**	41.7 %	27.2%	221.5 %
Middle East	193,452,727	2.9 %	**33,510,500**	17.3 %	2.7 %	920.2 %
North America	334,538,018	5.1 %	**234,788,864**	70.2 %	18.9%	117.2 %
Latin America	556,606,627	8.5 %	**115,759,709**	20.8 %	9.3 %	540.7 %
Oceania / Australia	34,468,443	0.5 %	**19,039,390**	55.2 %	1.5 %	149.9 %
WORLD TOTAL	6,574,666,417	100.0 %	**1,244,449,601**		00.0 %	244.7 %

IPv4 Achieved the Critical

IPv6 Can Drive Growth & Continuity!

Dr. Robert M. Metcalfe
Ethernet Inventor & Advisory Director

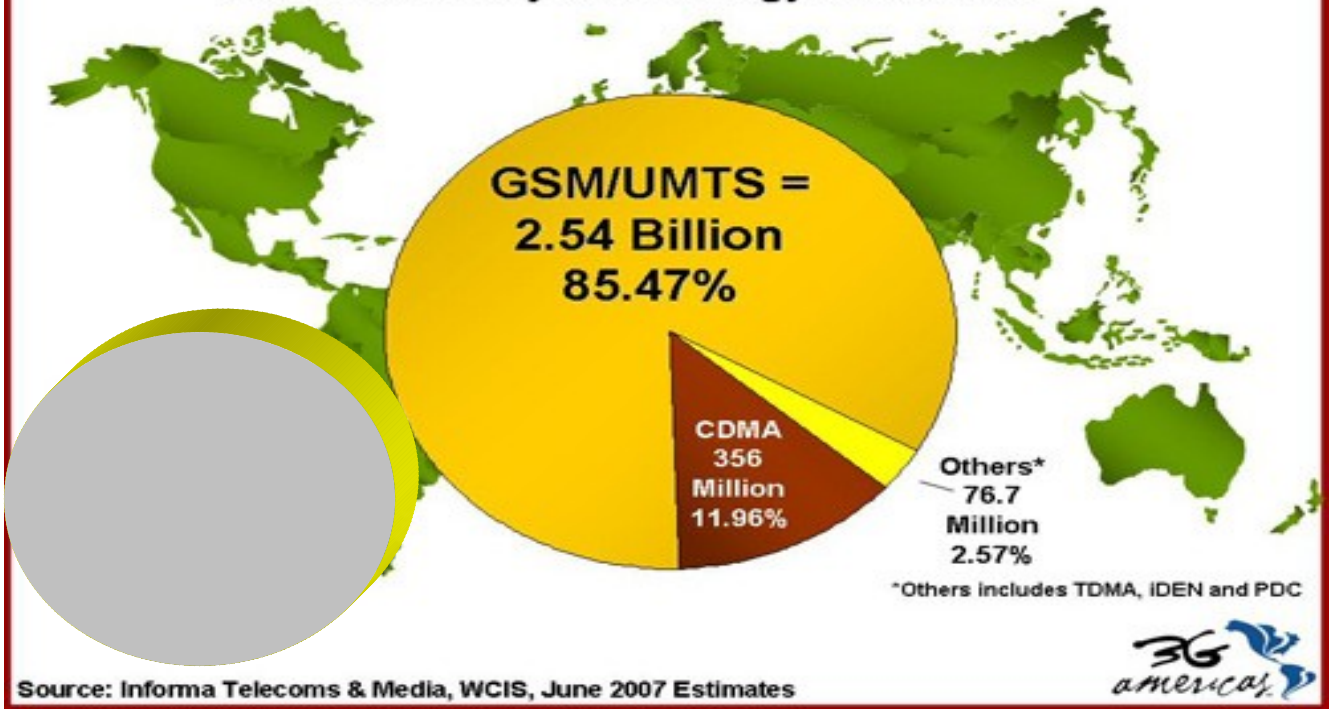
Dear NANOG,

You've perhaps already heard that I made good on a promise to eat the 12/4/95 InfoWorld column in which I predicted Internet collapses during 1996.

IPv6 FORUM

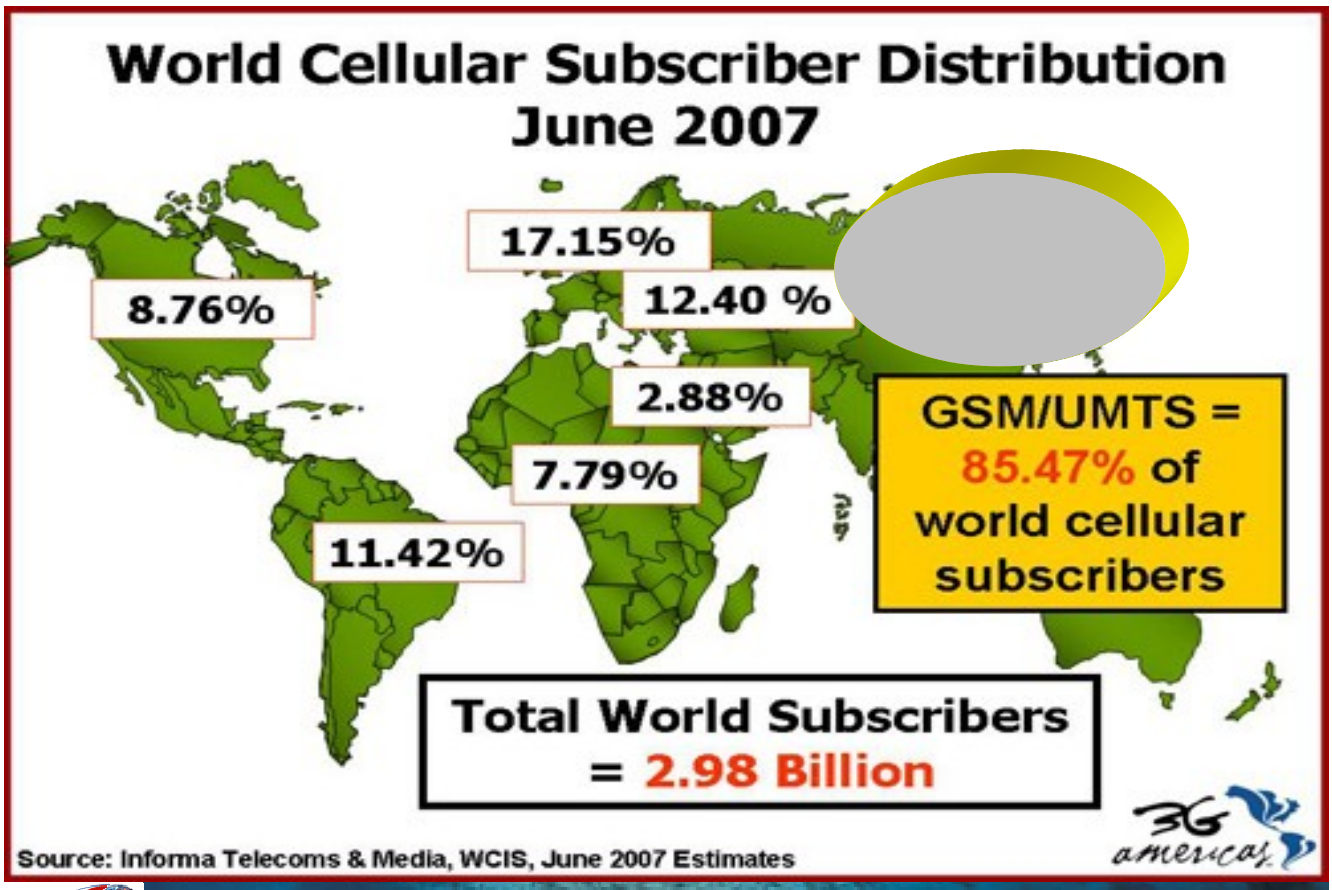
Vision & Way Forward

The World Wireless Market
Subscribers by Technology June 2007

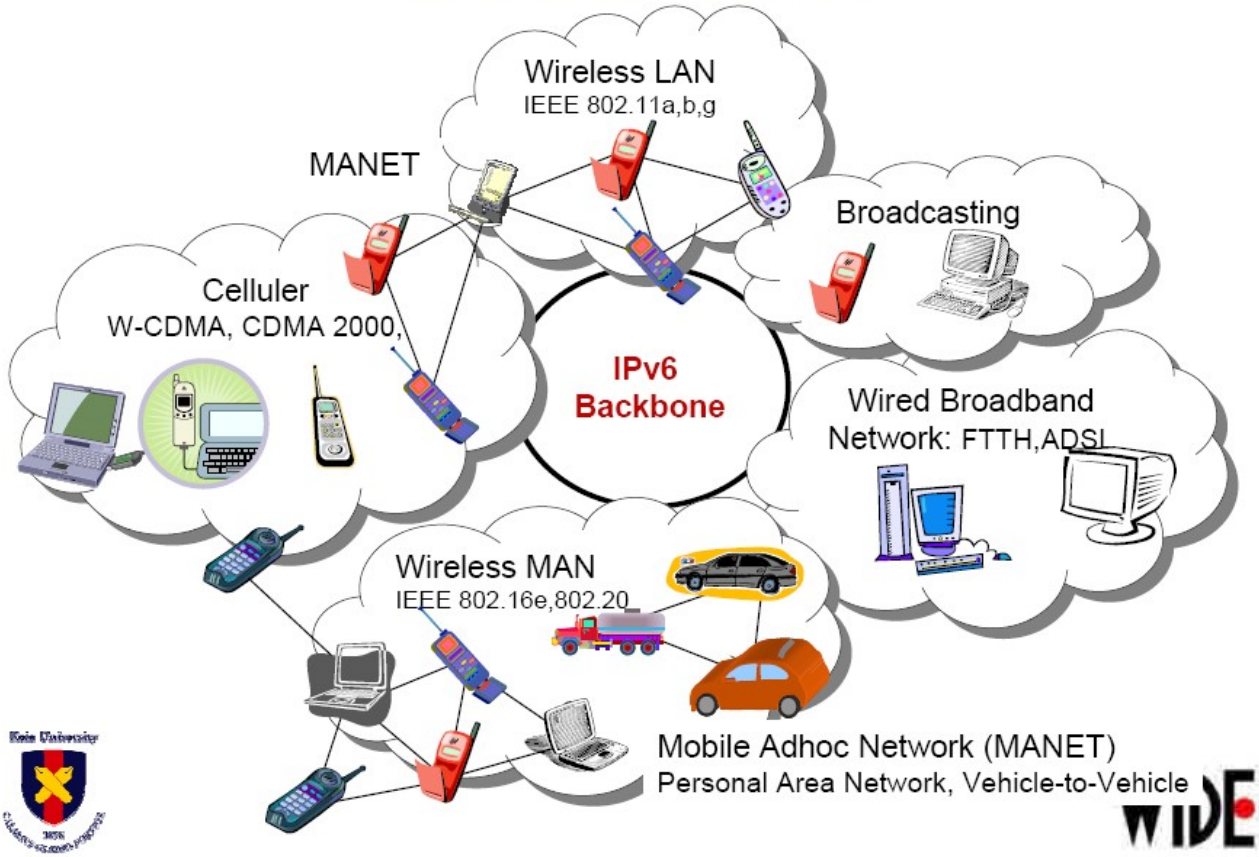


IPv6 FORUM

Vision & Way Forward

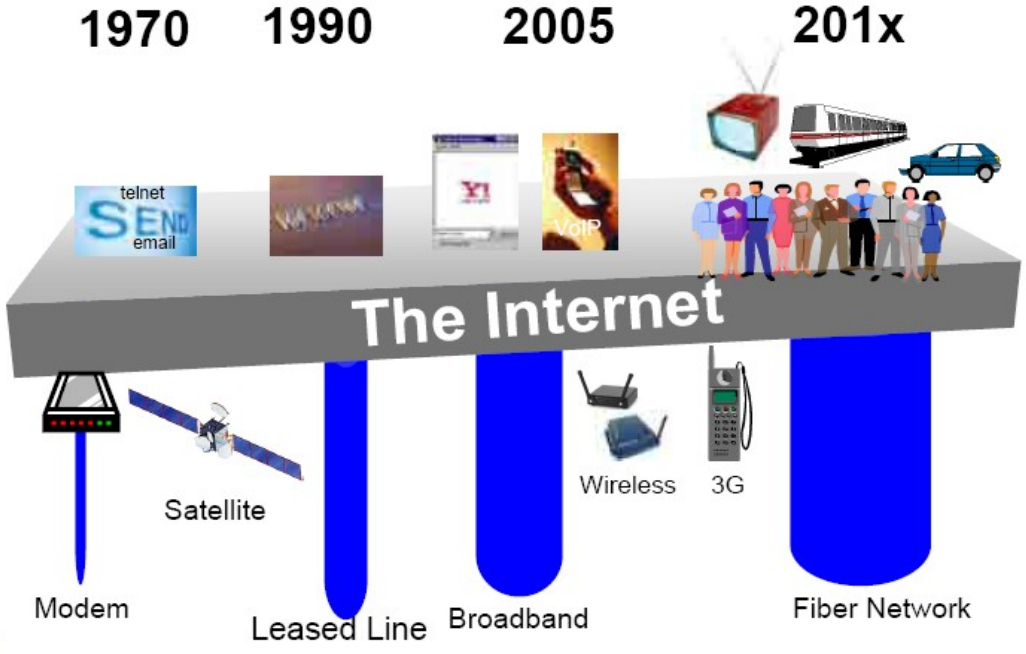


WWW: WORLD WIDE WIRELESS



The Internet

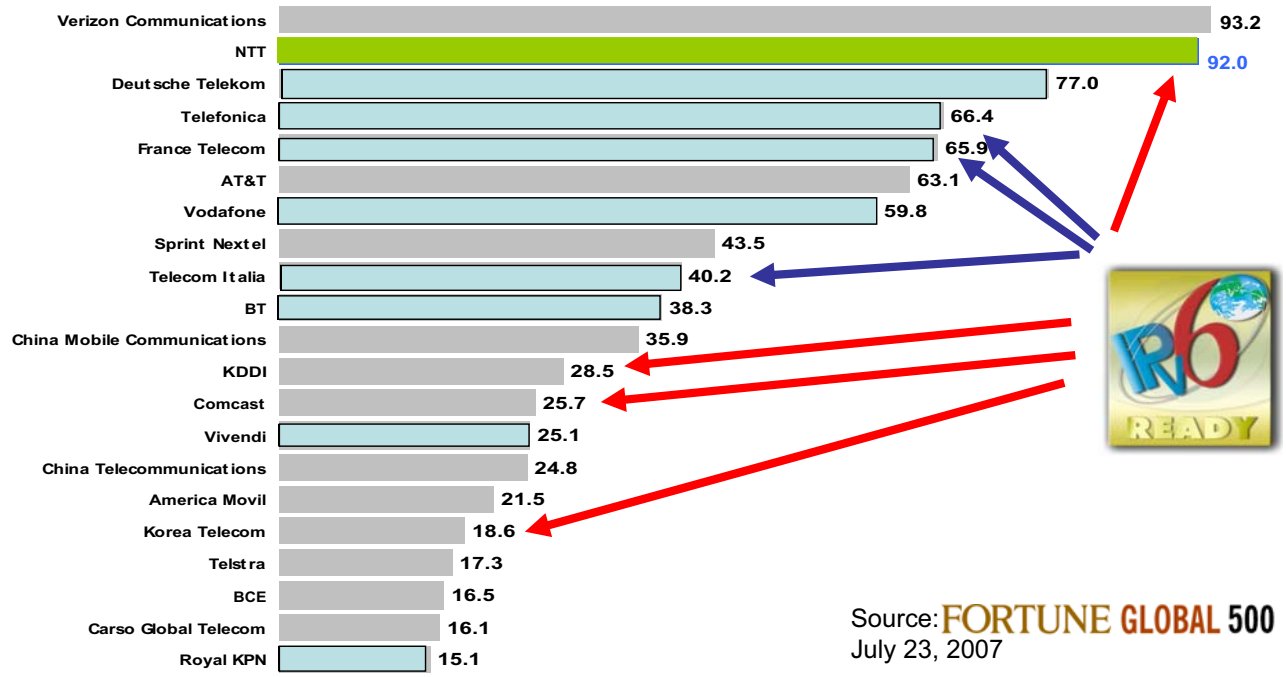
"Common Infrastracture for Digital Information"



"Place for freedom of creativities"

WIDE

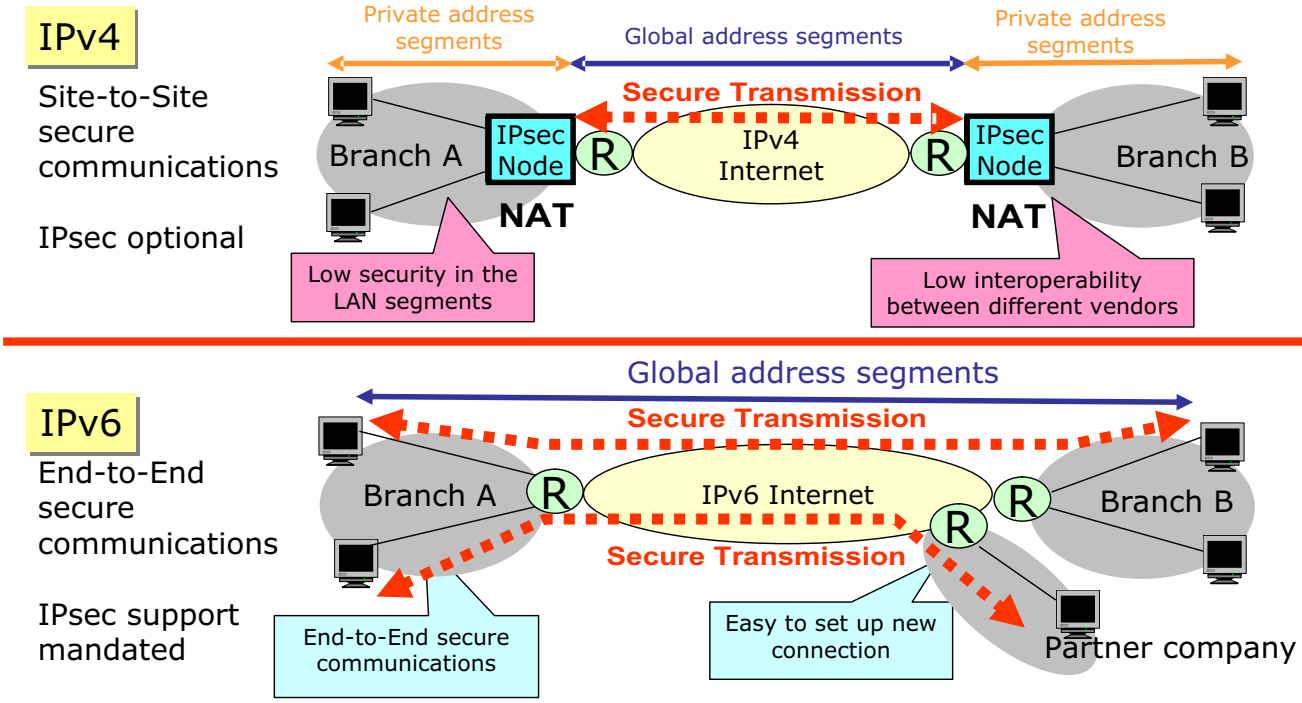
World's Top 21 Telecom Companies by Revenue ($US Billion)



Source: FORTUNE GLOBAL 500
July 23, 2007

IPv6 vs. IPv4 Security Model

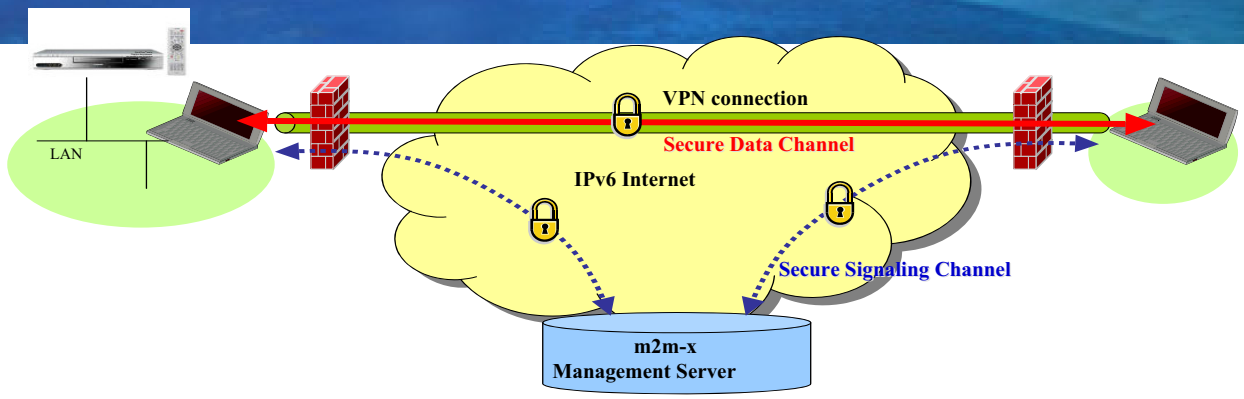
Easy to configure IP-VPNs between end-to-end nodes with IPv6



The UOPF and m2m-x

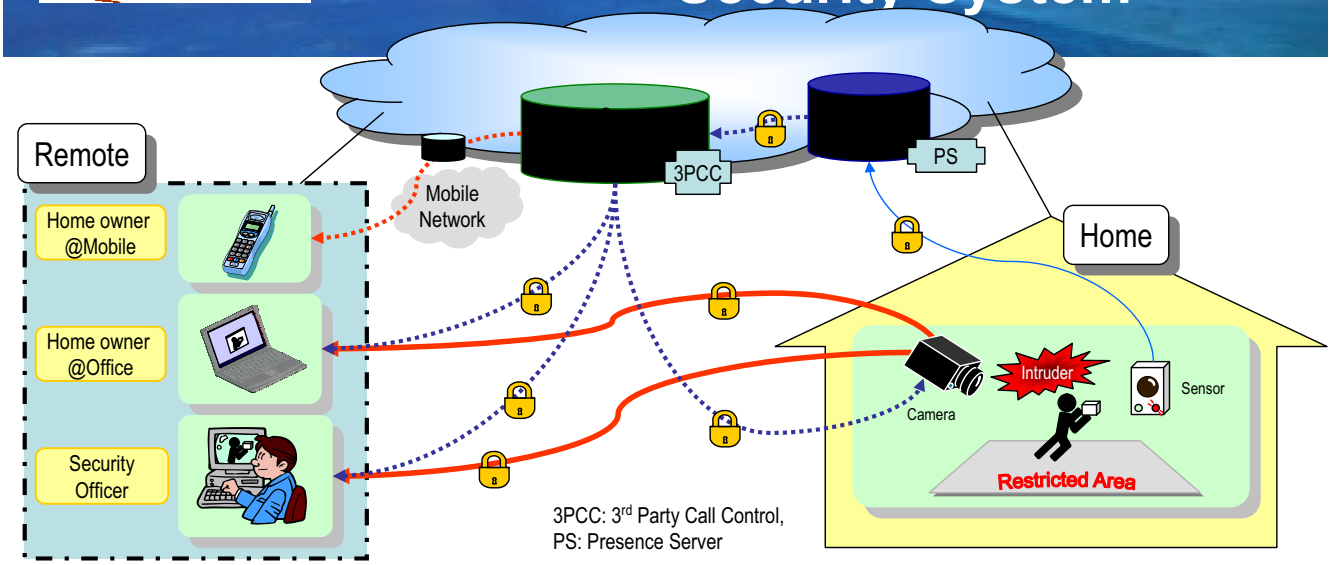
- **Ubiquitous Open Platform Forum**
  - ISPs and appliance manufactures established the UOPF in February of 2004 to accelerate the Internet Appliance market.
  - ISPs: NTT Com, KDDI, Fujitsu, NEC, Panasonic, Sony
  - Manufactures: Hitachi, Matsushita, Mitsubishi, Panasonic, Pioneer, Sanyo, Sony, Toshiba
  - http://uopf.org/en/
- **m2m-x**
  - m2m-x is an open standard - the UOPF published the technical specifications in April of this year.
  - One great example of a peer-to-peer technology.
  - The basis for m2m-x is to create new IPv6 business models and provide customers with “secure, easy, and real-time communications between objects on an end-to-end basis.”

m2m-x Technology



- m2m-x = machine to machine security (authentication and encryption) anytime, anywhere
- Designed to facilitate secure communications between appliances, computers, and any other device
- Based on IPsec and SIP
- Authentication, connection management, and configuration is controlled by a central m2m-x management server
- After necessary connection management by m2m-x server, data communications between devices is conducted peer-to-peer with IPsec encryption with no intervention by the m2m-x server

Example 1: Smart Home Security System

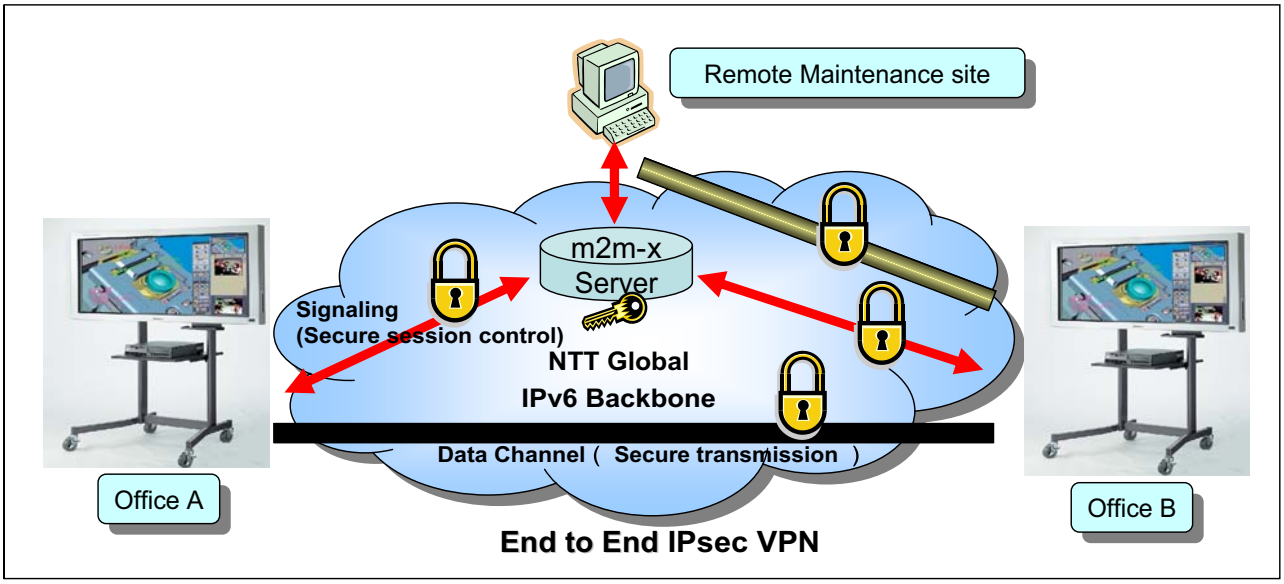


Upon detecting an intruder, the system instantly finds the current location of the authorized watcher (e.g. home owner) and establishes a video connection.

Features: *Secured communication*: m2m-x security *Strict Authorization*: No third party eavesdropping
Application Integration: Uses SIP 3PCC for connection establishment
Other Applications: Office-building, Industry, Campus, Home security, Emergency Services, Remote Health Care

Example 2: Cyber Conferencing System

IPv6 ready collaboration system works based on the m2m-x authentication platform. For remote site meeting facilitation, this system enables not only video communications but also sharing images, applications and handwritten notes on the screen between remote sites - interactively and securely.



IPv6 @ Comcast Managing 100+ Million IP Addresses

NANOG 37

Alain Durand
Office of the CTO
Director – IPv6 Architect
Alain_Durand@cable.comcast.com

Simplistic View of Comcast IP problem

20 Million video customer

2.5 set-top box per customer

2 IP addresses per set-top box

Total: 100 Millions IP address

And we have not yet talked about High Speed Data…
nor Comcast Digital Voice…
nor merger/acquisition…

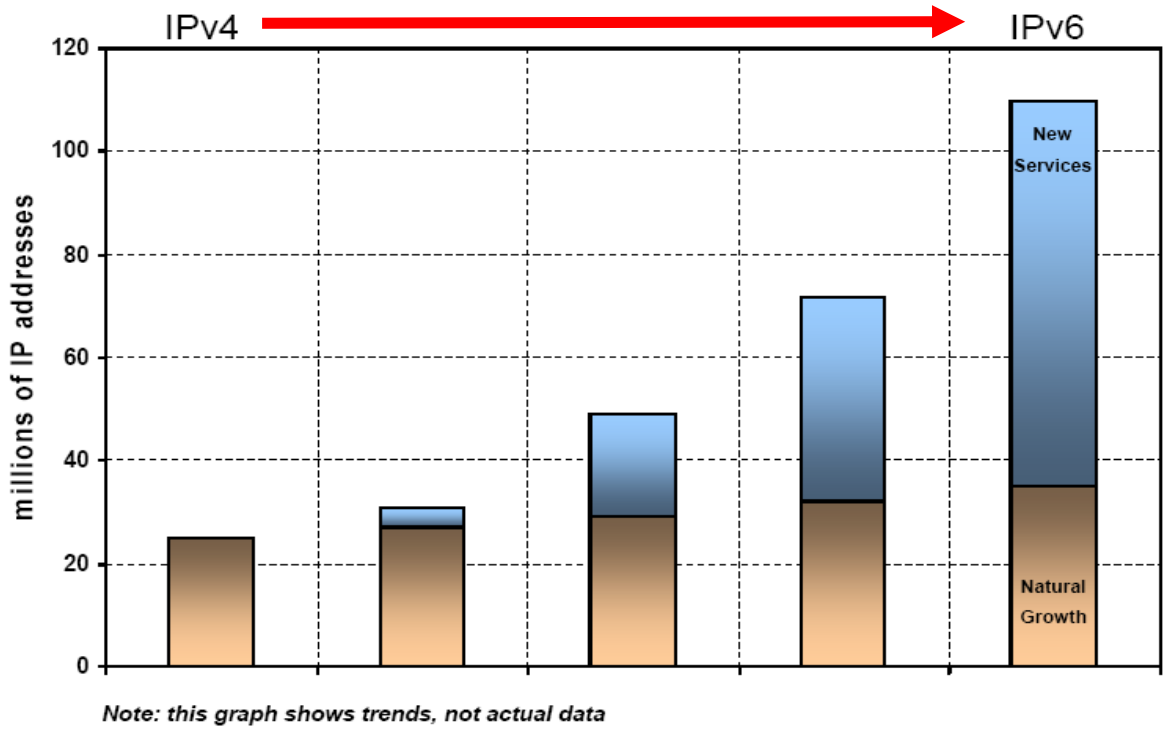
From Net 10 to IPv6 in the Control Plane

- Until recently, Comcast was using ***Net 10 (RFC1918)*** for managing the cable modems.
- That space has been ***exhausted*** in 2005.
- Comcast recently was allocated the largest part of ***Net 73*** and has renumbered cable modems in that space.
- In the control plane, all devices need to be remotely managed, so NAT isn't going to help us…
- IPv6 is the clear solution for us
- However, even we are starting now, the move to IPv6 is not going to happen overnight

IPv6 Strategy

- ***Start early***
  - Deployment plans have started back in 2005
- Deploy IPv6 ***initially*** on the ***Control Plane*** for the ***Management*** and ***Operation*** of the ***Edge Devices*** we manage
  - Docsis CM, Set Top boxes, PacketCable MTA (Voice),…
- Be ready to offer our customers new services that take advantage of IPv6

IP Addresses: Natural Growth vs New Services
(in the coming years)



Note: this graph shows trends, not actual data

At Bechtel IPv6 is all about business…

- Response to changing business models
- Global technical positioning
- New capabilities
- Engineering systems convergence to IP
- Customer-partner-vendor-induced IPv6 insertion

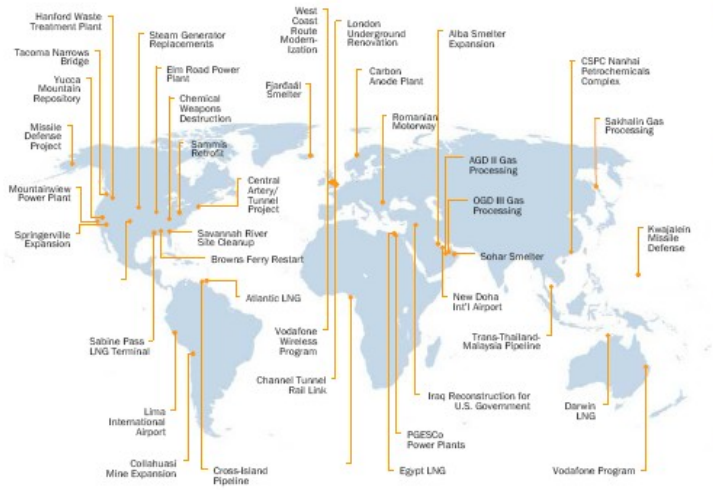
Protocol Trends in Control Networks

Non-IP	IP
BACnet	BACnet/IP
Fieldbus	Fieldbus HSE
PROFIBUS	PROFInet
Others	IP-based

Many other significant change drivers

- Economics, Interoperability, Simplify
- Security
- Customer requirements

Implications of Project-Based Environment



- Highly mobile workforce
- Volatile infrastructure
- On-demand collaboration
- Dynamic IP & IA needs
- Constant tech evolution

Bechtel IPv6 Strategy

Develop Sustainable IPv6 Competence Through Experience

–Foundation first

–Keep IPv4 (for now) – Add IPv6

–Broad deployment of expected successes

–Ensure nothing breaks (in production)

–Maintain / improve security

–Use natural change mechanisms when able

–Actively engage key technology partners

Bechtel IPv6 Strategy

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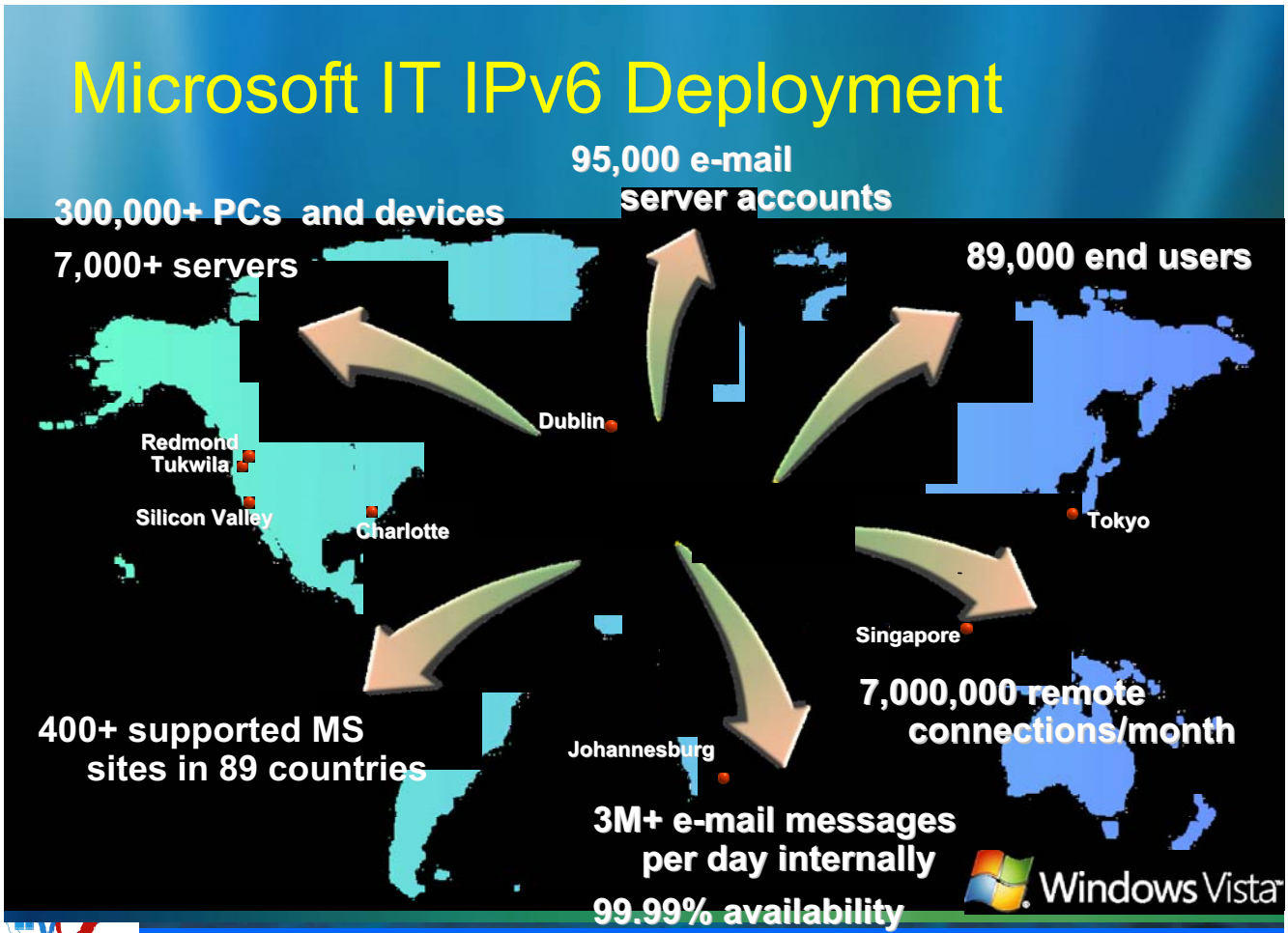
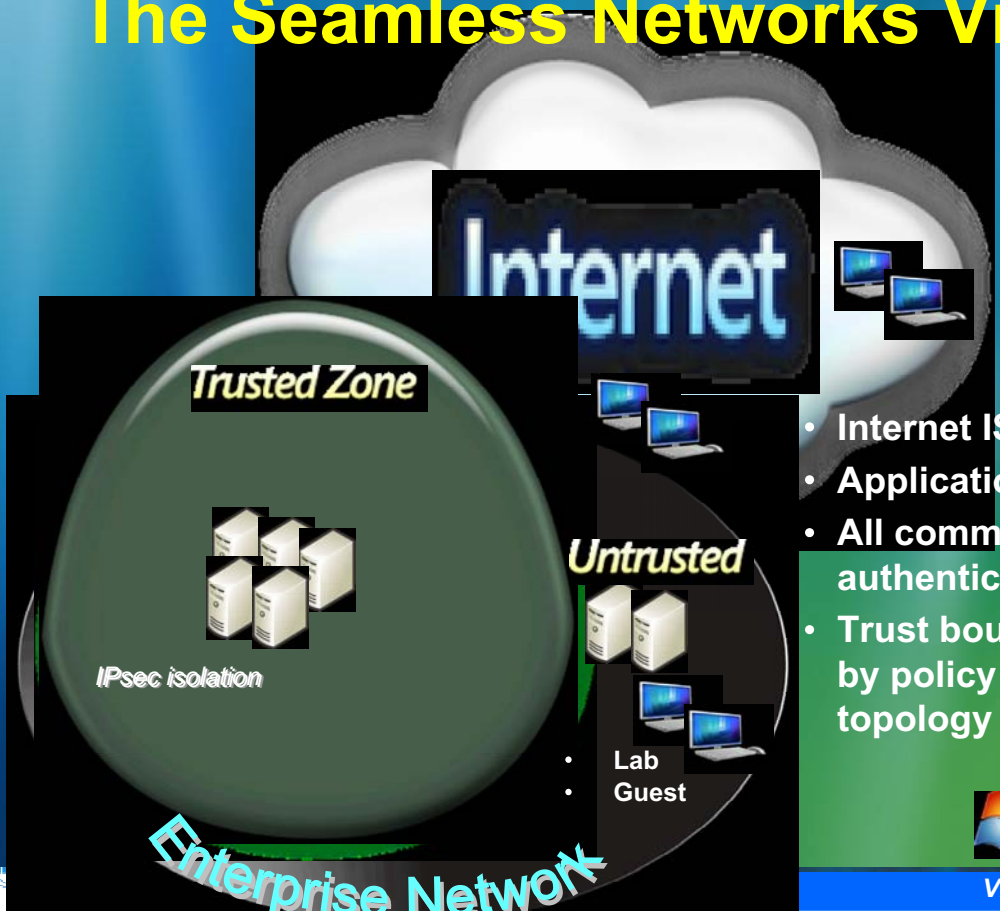
Microsoft IT IPv6 Deployment



The Seamless Networks Vision



- Internet IS your network
- Applications just work
- All communications authenticated
- Trust boundaries defined by policy instead of topology

Windows Vista

IPv6 is a Key Building Block

- The seamless network demands new paradig
  - Ease of connectivity
  - Security
  - Mobility
- IPv6 is required to support the new network

Windows Vista

IT Complexity & Cost

Microsoft
Your potential. Our pa

IT Budgets

200B

'08

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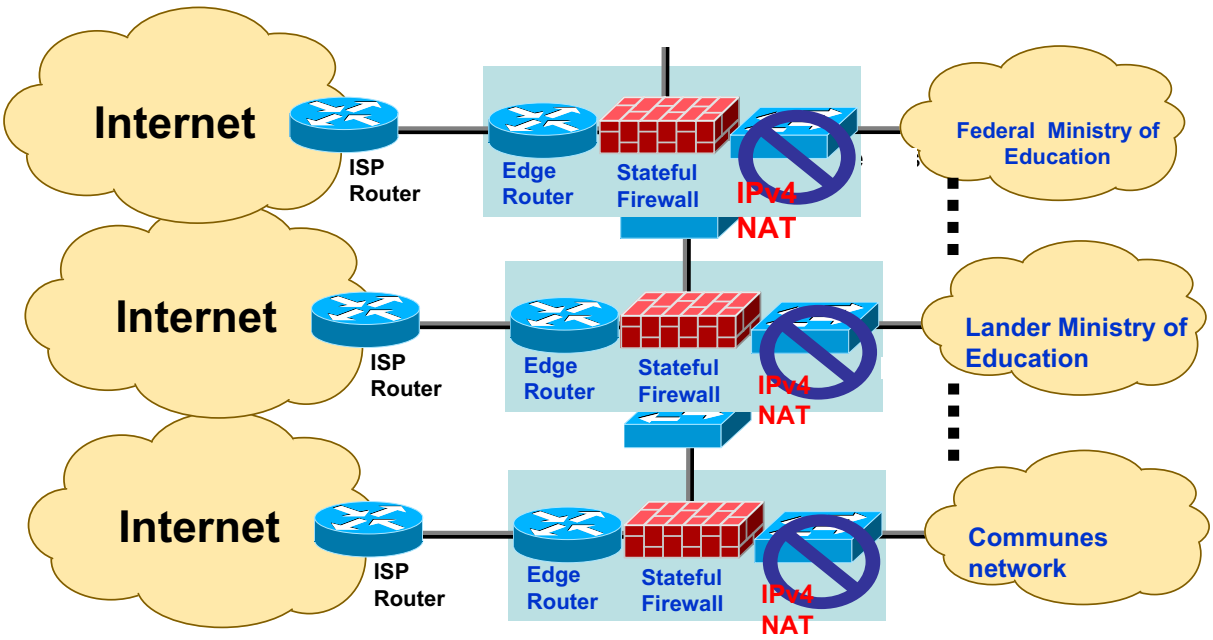
Vision & Way Forward

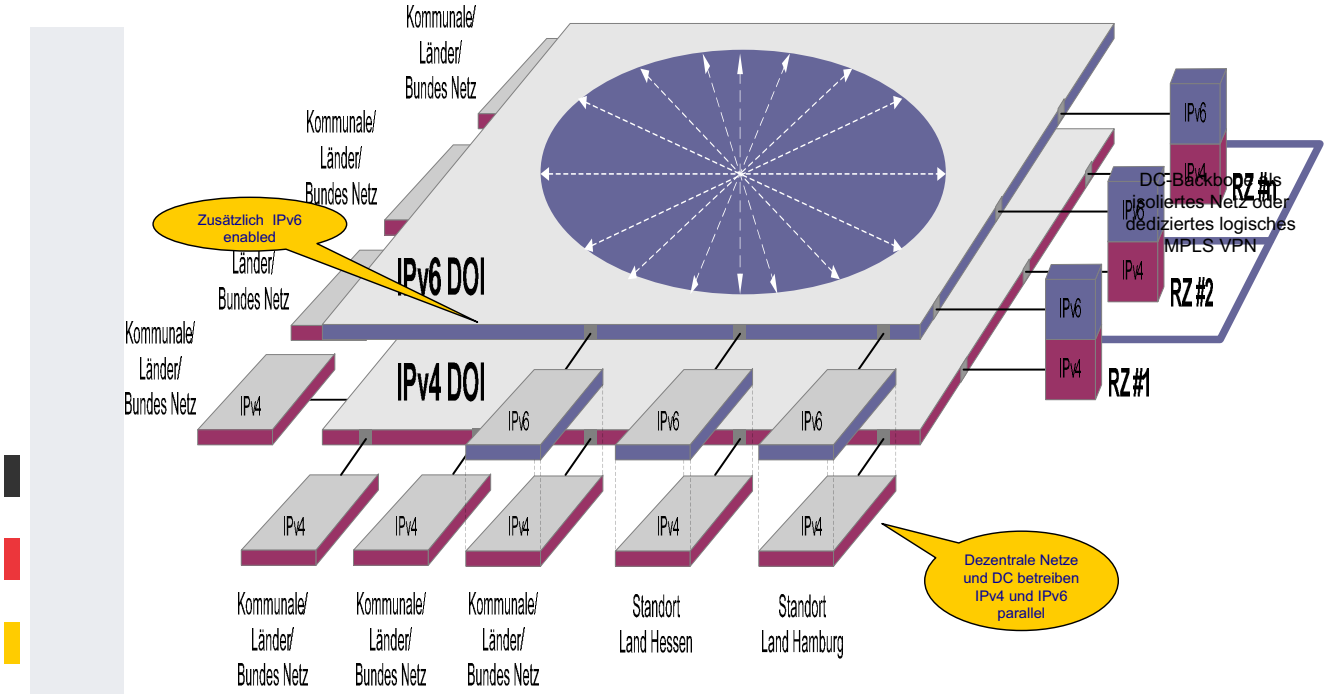
German Federal Government
Simple email as Driver



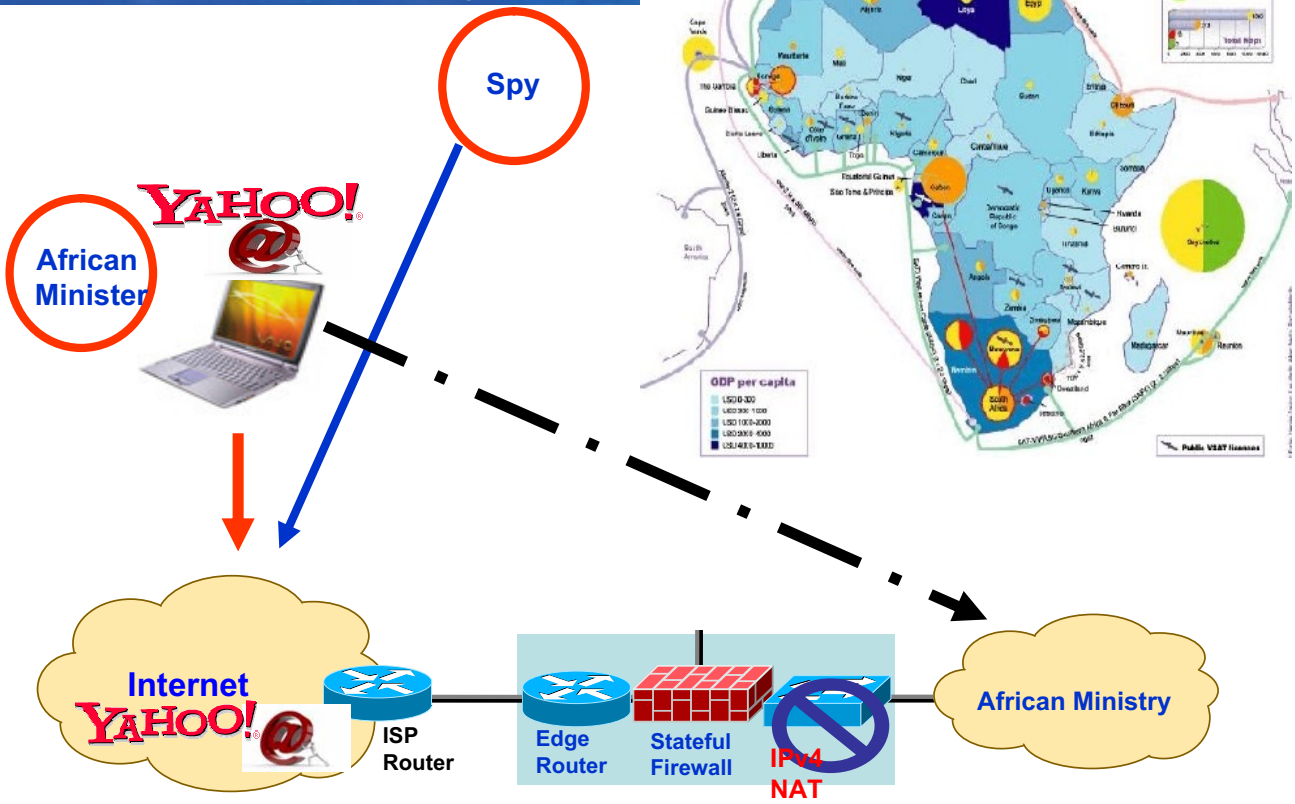
IPv6 FORUM

Vision & Way Forward

Die DOI definierte IPv4/IPv6 Dualstack Zielarchitektur …



Developing Nations Ministers Yahoo email – the only email

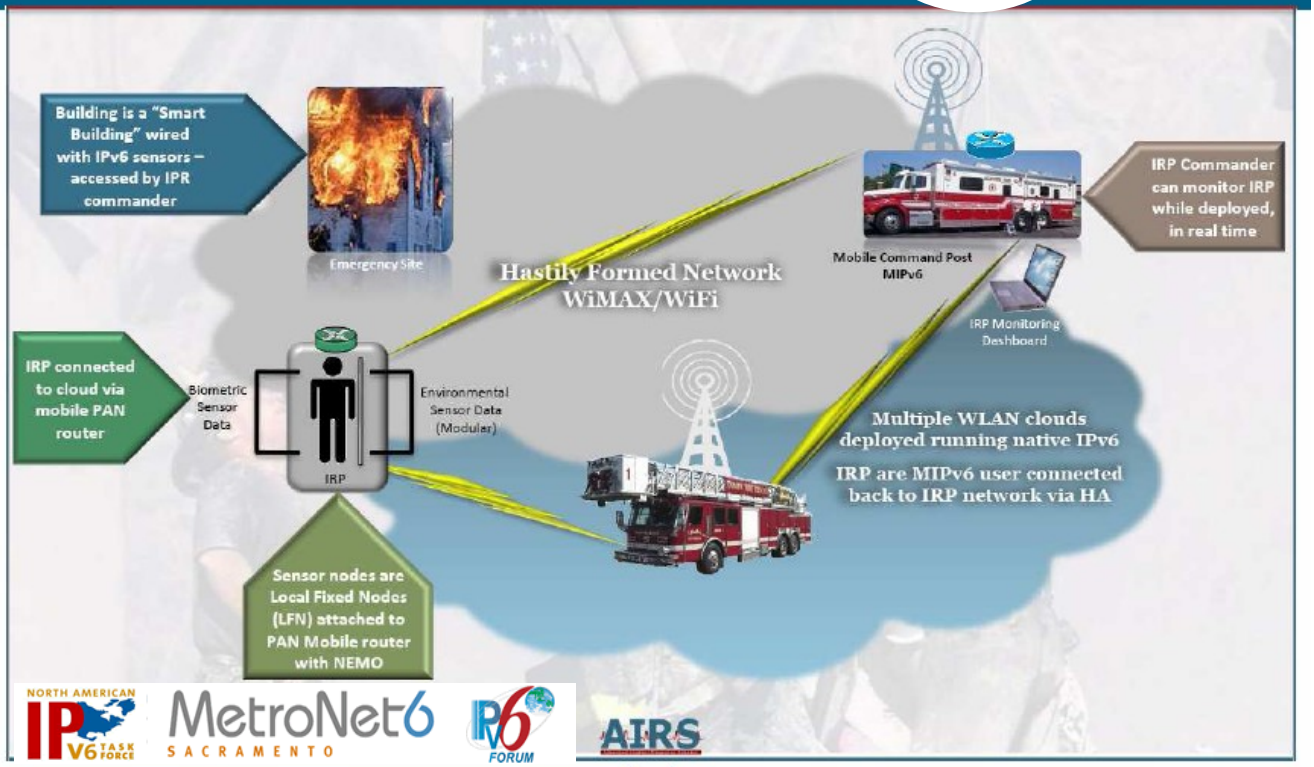


Emergency Response

Solution Overview

- Enhances Interoperability
- Optimizes Command & Control
- Improves Situational Awareness

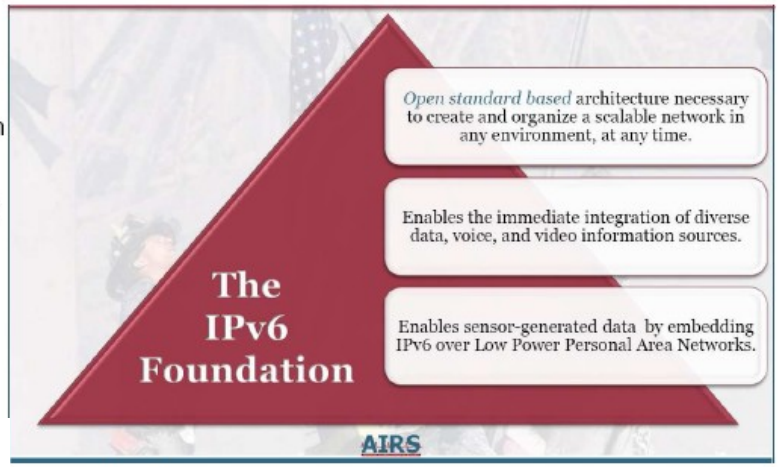
AIRS Functional Diagram



AIRS – Why IPv6?

The Global reach of IPv6 networks allows local responder networks to be linked back to any rear-area network or competency center, in a secure manner, to engage global experts for highly specialized skills.

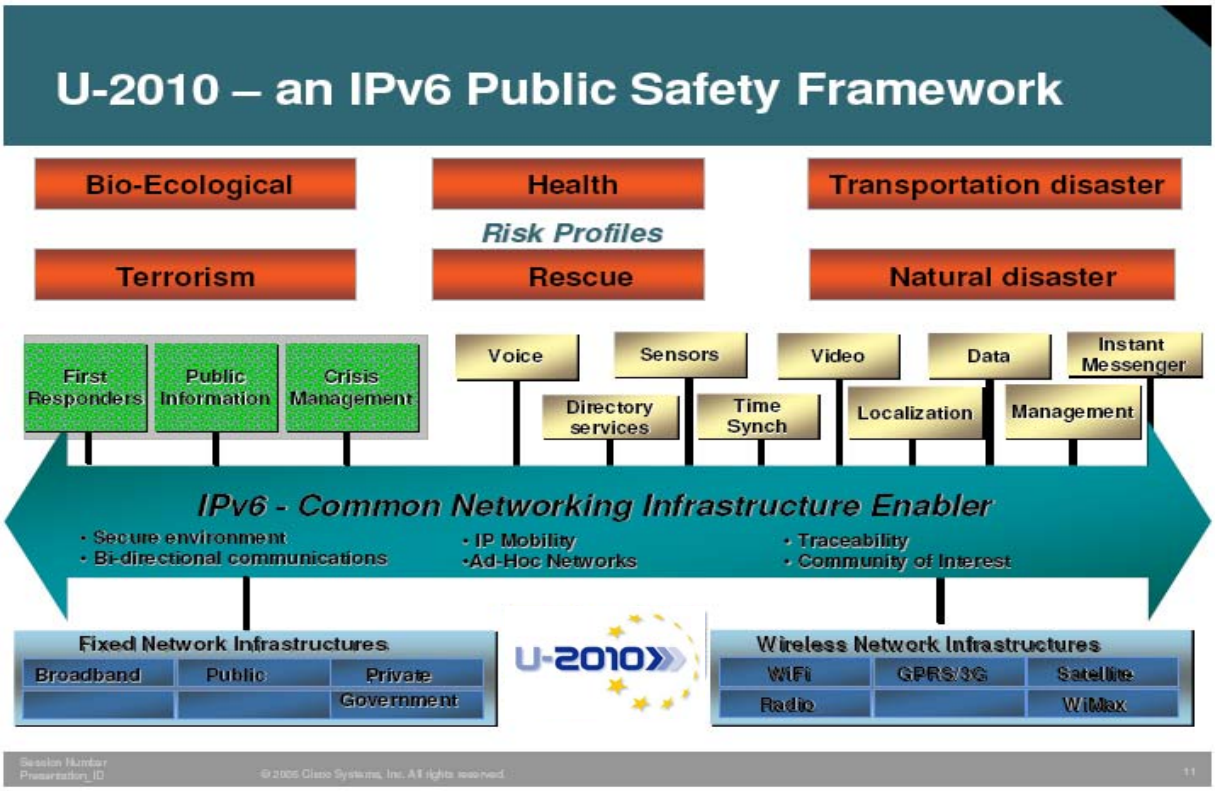
- ✓ Collaboration Across Agency/Jurisdiction
- ✓ Optimized Command & Control
- ✓ Common Operational Picture
- ✓ Location Based Communities of Interest
- ✓ Neighbor & Service Discovery
- ✓ Peer to Peer Communications
- ✓ Sensor Array Access
- ✓ Proactive Health Tracking
- ✓ Physical Location Tracking



NORTH AMERICAN IPv6 TASK FORCE · MetroNet6 SACRAMENTO · IPv6 FORUM

cisco

Government & Industry
Emergency & Crisis Management



Embedding in the Physical World

ARCHROCK

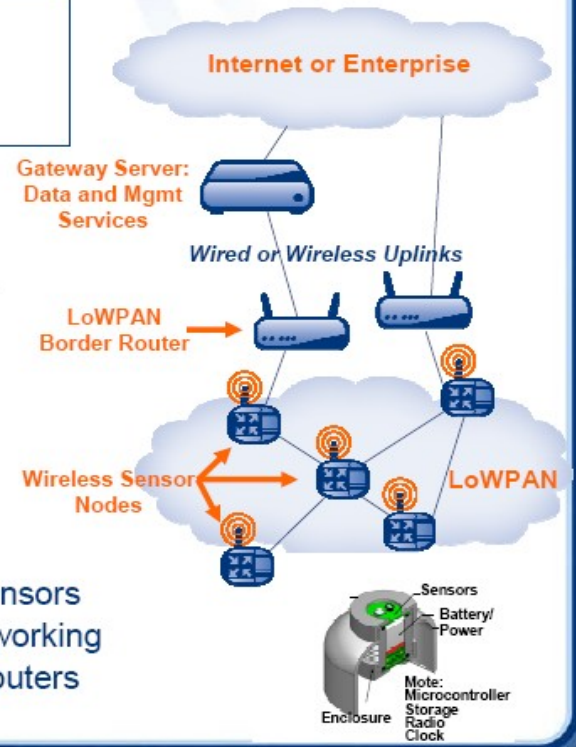
- The world is outfitted with **billions** of devices sensing their environment
- Homes, offices, factories, streets, hospitals, automobiles….people
- Issue:
  - **Data is dropped** or remains local

- Arch Rock Solution:
  - **Extend reach** and lower cost through low power wireless mesh networks
  - **Provide global visibility** by bringing sensors on the Web and the IP network

What is a Wireless Sensor Network?

ARCHROCK

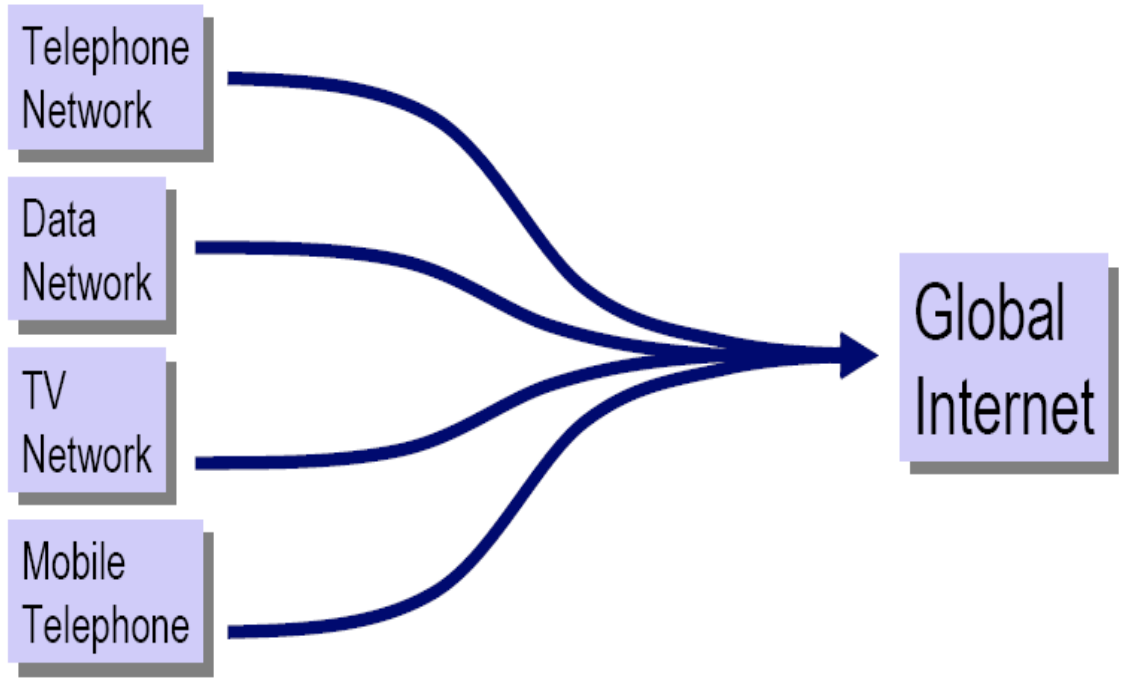
- **Network of small-footprint computers**
- **Optimized for long-life on low power**
- **Equipped to sense physical data**
- **Networked using low-power radio**



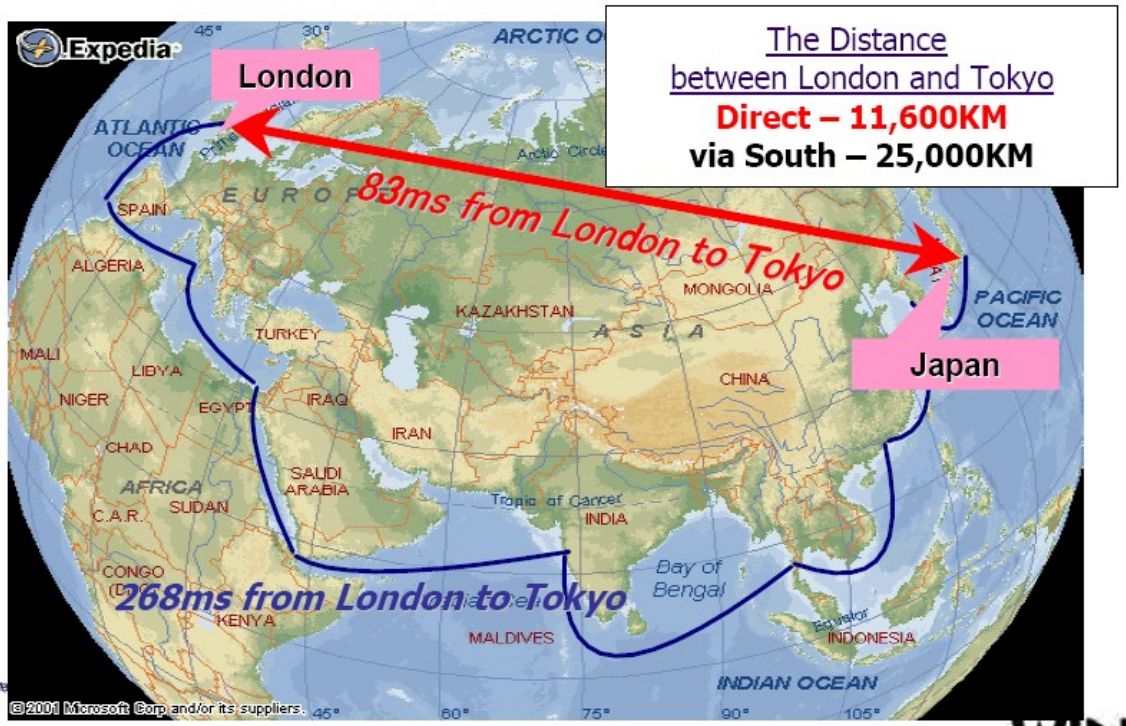
- **Function:**
  - Sense any measurable parameter
    - Light, motion, chemicals, proximity, biometrics
  - Form network and communicate
    - Automatic meshing and routing over the air
    - Form "LoWPAN": Low Power Area Network
  - Apply user-defined business logic
    - Sampling, summarizing, reporting events
- **Form:**
  - Mote (Processor, Radio, Storage) + Sensors
  - Embedded Operating System and Networking
  - Edge Gateways or LoWPAN Border Routers

Digital Convergence:

One Network Connecting Everyone



Round Trip Time Comparison
Direct vs. Southern route



WIDE

Sharing intelligence within a second

WIDE

With Everyone!

INTERNET USERS WORLD MAP 2015


IPv6
The Two-way Internet
Mankind Progress
-Water
-Electricity
-Voice
...>>>Everything over IP
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Windows Vista
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