IPv6 Tutorial

North American IPv6 Conference

Santa Monica, CA

June 2004

Tutorial Logistics

- Location of refreshments
- Breaks
- Speakers
- Availability of Slides post tutorial
- Questions?

Tutorial Agenda

- **8:30 – 9:00 AM**   Tutorial Logistics & Introduction to IPv6 (Yurie Rich –   Native6, Inc.)

- **9:00 – 10:00 AM**   IPv6 Fundamentals (John Spence – Native6, Inc.)

- **10:00 – 11:00 AM**   Advanced IPv6: Network Services (John Spence)

- **11:00 – 11:45 PM**   IPv6 & Routing Protocols (Jeff Doyle – Juniper Networks)

- **11:45 – 12:45 PM**   Lunch

- **12:45 – 2:00 PM**   IPv6 & Transition: Integration mechanisms (Marc Blanchet - Hexago)

Tutorial Agenda

- 2:00 – 2:45 PM   IPv6 & Security (Dennis Vogel - Cisco)

- 2:50 – 3:30 PM   IPv6 & Mobility (Carl Williams – MCSR Labs)

- 3:35 – 4:20 PM   IPv6 Header Compression (Emre Ertekin - Booz Allen Hamilton)

- 4:20 – 5:30 PM   Deploying IPv6: Lessons from the Experts

- A. Deploying IPv6 in the Service Provider Network (Heather Sze –   Cisco)

- B. Deploying IPv6 in the Enterprise Network (John Spence)

- C. Deploying IPv6 in the SO/HO/Home Environment (Jordi Palet - Consulintel)

Internet Evolution

	1975	1993	Today
When	**1975**	**1993**	**Today**
# Users	**Thousands**	**Millions**	**Billions**
Who	**Academics & Government**	**Innovators & Business**	**Everyone & Every Device**
Killer App	**Email & FTP**	**WWW**	**End-to-End**
How	**Dial-Up**		**Always-on**
Scope	**Government Internet**	**Public Internet**	**Pervasive Internet**
	ARPANET	**IPv4 Internet**	**New Internet**

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What IP is touching

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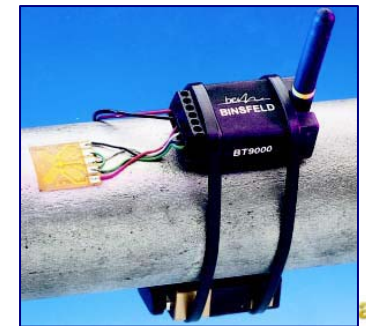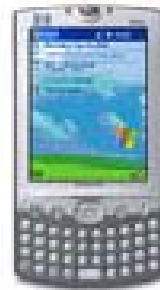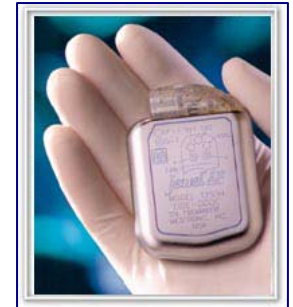
Heterogeneous Networks

3G Regional Area

WLAN Low-tier

3G High-tier

**Local Area**

Wide Area

High Mobility
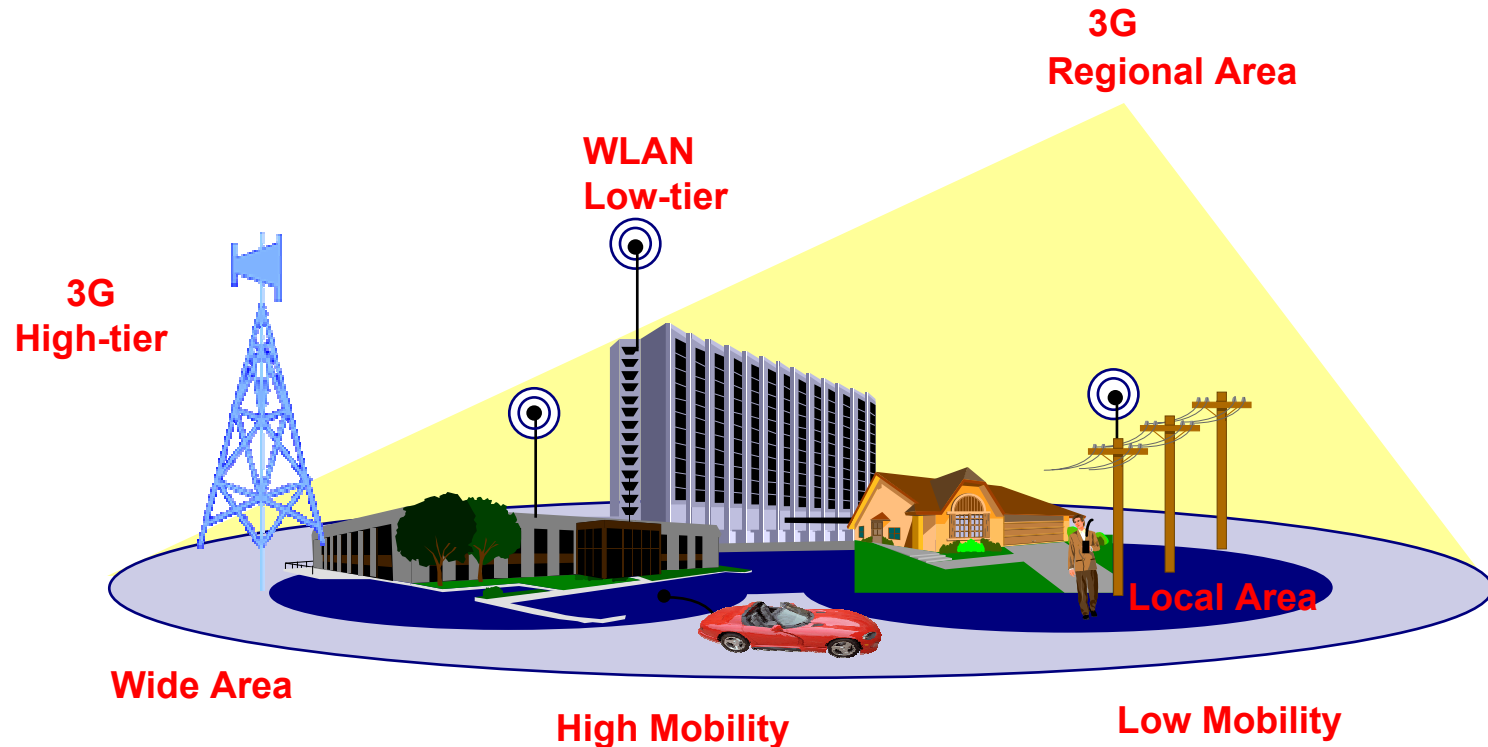
Low Mobility

- Seamless mobility across diverse overlay networks

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History of IPv6

1994 - RFC 1726 outlines technical criteria for next generation IP

1998 - RFC 2460 deprecates RFC 1883 with improvements in protocol

Today

Dec. 1993, RFC 1553 solicits input for next generation IP development

1995 - RFC 1883 standardizes IPv6 basic features

Today - dozens of standards and drafts outlining transition, IPv6 interoperability, routing, and operation with other protocols and standards

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IPv6 Features - Address

- **More Address Space**
    - ☐ Lengthened from 32 bits to 128 bits
    - ☐ Even with autoconfiguration, 2^64 is big!
- **IPv4 addresses $2^{32} \approx 4$ billion**
- **IPv6 addresses $2^{128} \approx 340$ undecillion**
    - ☐ If IP addresses weighed one gram each
        - IPv4 = half the Empire State Building
        - IPv6 = 56 billion earths

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Address Allocation

- Addresses are no longer "owned", but rather "leased" from the ISP.
  - forces good summarization
  - creates some challenges for multihoming
  - creates easier movement from ISP to ISP
  - has renumbering implications
  - "culture shock" for many organizations

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IPv6 Features

- **Autoconfiguration**
  - ☐ Plug-and-Play networking that supports roaming
  - ☐ Greatly lowers the amount of administration
  - ☐ Creates user-friendly process for "smart devices" in home networks

- **End-to-End model**
  - ☐ No intermediary nodes manipulating packets en route
  - ☐ Allows hosts to exchange data more securely
  - ☐ Accommodates ability to remotely access resources from any location/device

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Transition Technology

- **Encapsulation**
  - ☐ 6in4 Tunneling
  - ☐ IPv6/v4 relays and gateways (6to4)
  - ☐ ISATAP
  - ☐ DSTM
  - ☐ Tunnel Brokers
  - ☐ Teredo
- **Coexistence**
  - ☐ Dual Stack

- **Translation**
  - ☐ NAT-PT
  - ☐ BIA/BIS
  - ☐ TRT
- **Additional mechanisms not listed**

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Conclusion

- IPv6 protocol and supporting protocols continue to mature

- Numerous benefits yet to emerge

- IPv6 Market place today is vastly different than just 1 year ago.

The North American IPv6 Task Force welcomes and thanks you for your participation!

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