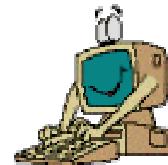




## Impact of IPv6 in the Telecommunications Industry



**Carl E. Williams**  
**IPv6 Forum Technical Directorate**  
**1998年1月1日星期四**



Connecting 6 Billion Humans,  
And then 6 Billion Computers...

# Some Wireless Industry Objectives

- Provide Seamless Mobility and anytime “always best connected” access
- Provide as many pervasive services as possible to as many users as possible
- Reduce Cost without effecting services
- Use the Internet to provide as many services and reach as many users as possible

# Internet today

- Virtual Private Networks
  - Tunnels
  - Private Addresses
  - Security at the Edge
- Network Address Translators (NATs) are required!
- End-to-End model is Lost
- Lack of Sufficient Address Space

**IPv4 unable to drive the future Wireless Internet**

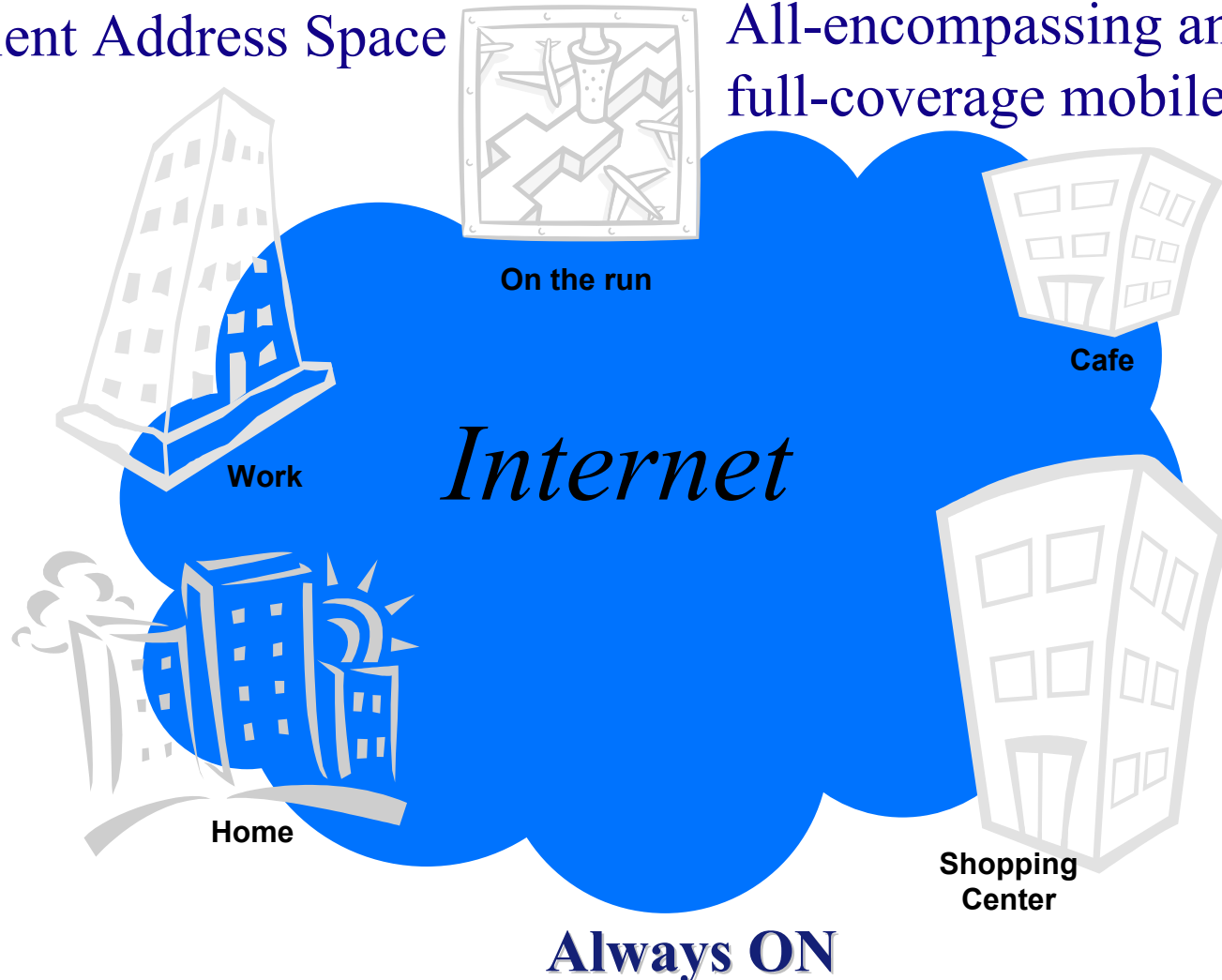
# IPv6: Driving the Wireless Future

**Everybody**

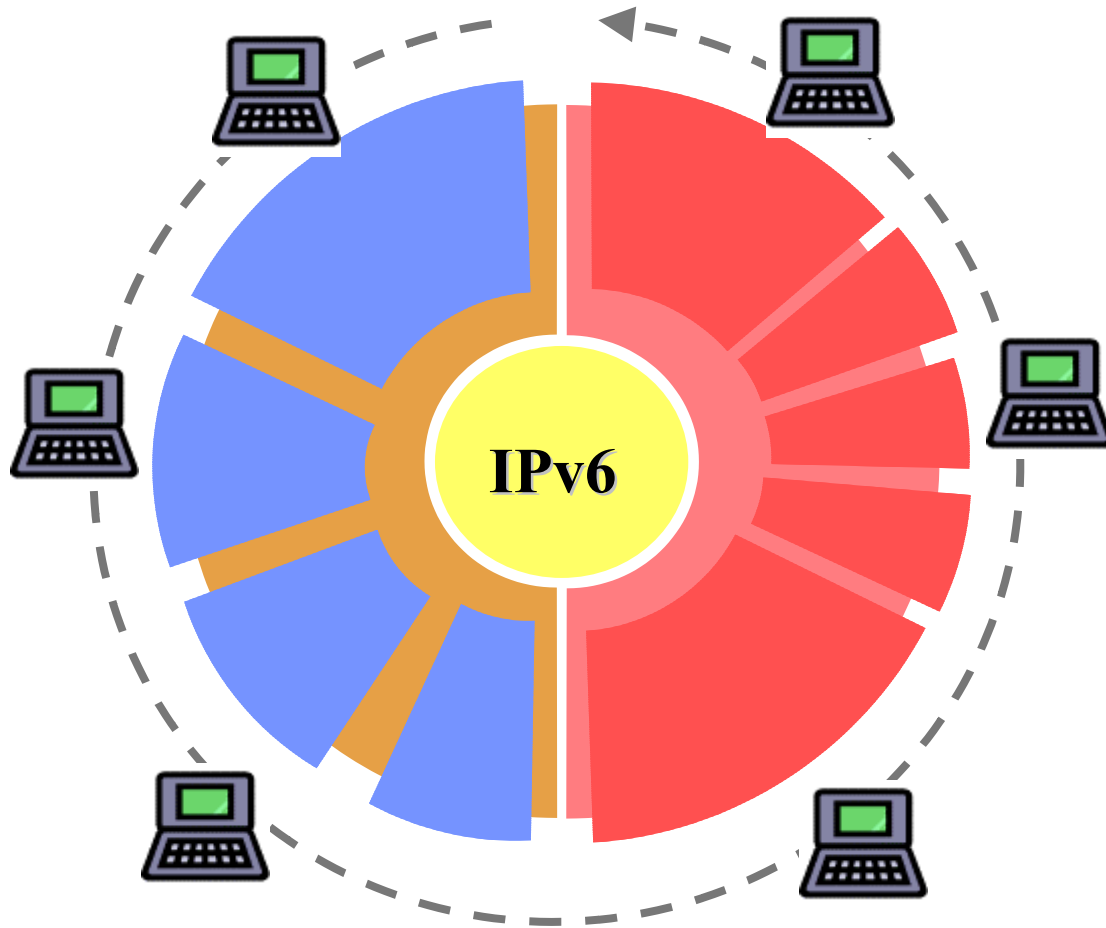
Sufficient Address Space

**Everywhere**

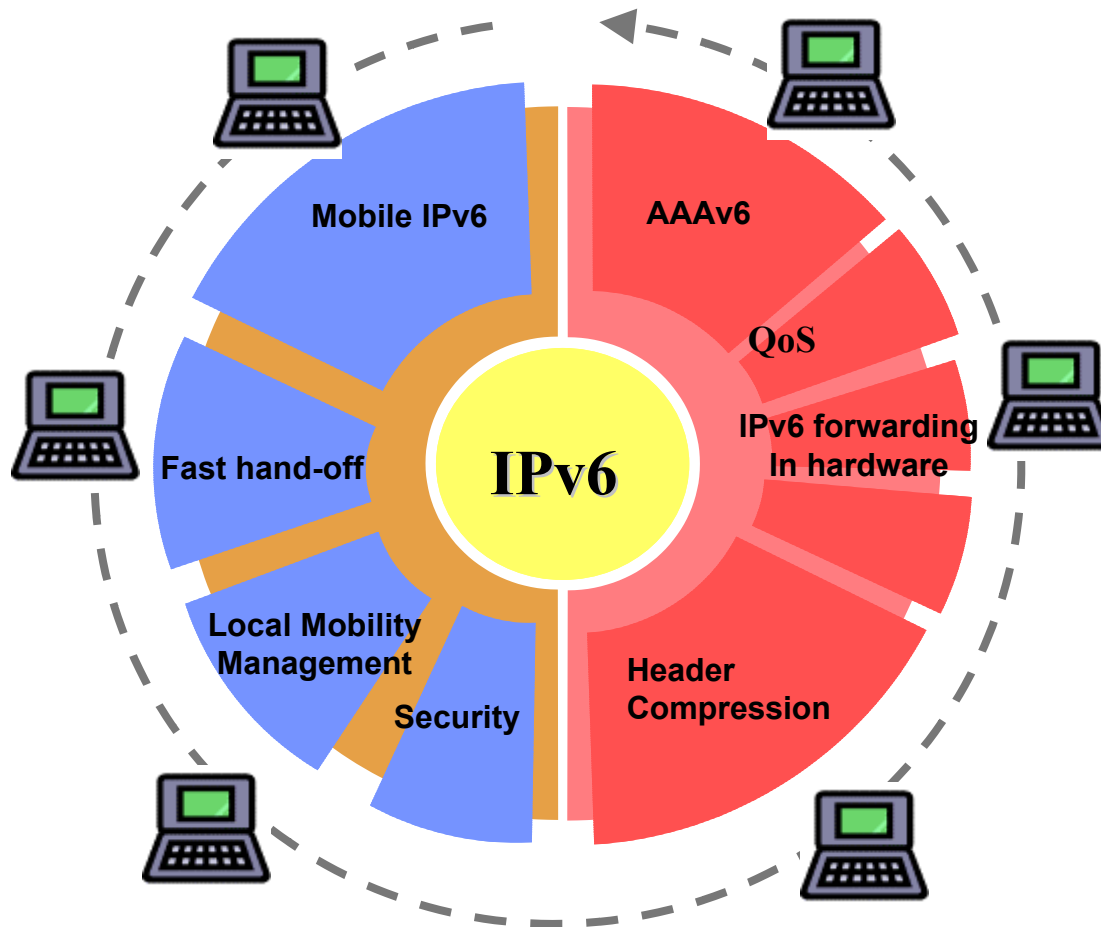
All-encompassing and  
full-coverage mobile network



# IPv6 and Mobile IPv6 Integration



# IPv6 and Mobile IPv6 Integration



# Mobile IPv6 – A natural extension to IPv6

## IPv6 Header Extensions

Destination options header

Routing header

## ICMPv6 Router Discovery

Router Advertisements

Router Solicitations

Stateful Address Autoconfiguration

Stateless Address Autoconfiguration

Neighbor Advertisement



# **Mobile IPv6 – A natural extension to IPv6**

**MN makes its location known to HA (or CN)**

**CN sends packets directly to MN at new location**

**MN Connect to HL or FL? Moved to another FL?**

**MN Obtaining a care-of address**

**HA intercepts packet for MN**

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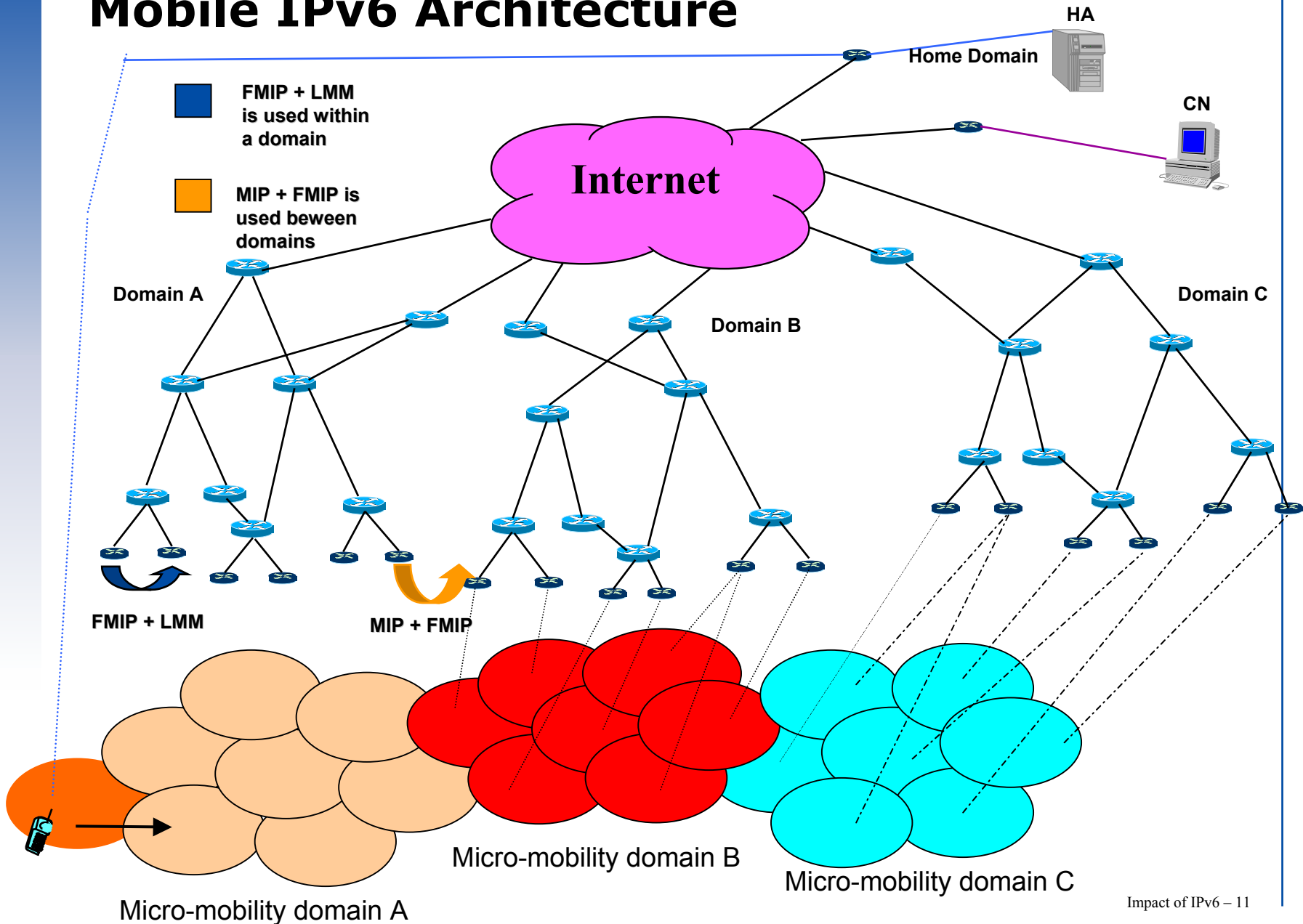
**Stateful Address Autoconfiguration**

**Stateless Address Autoconfiguration**

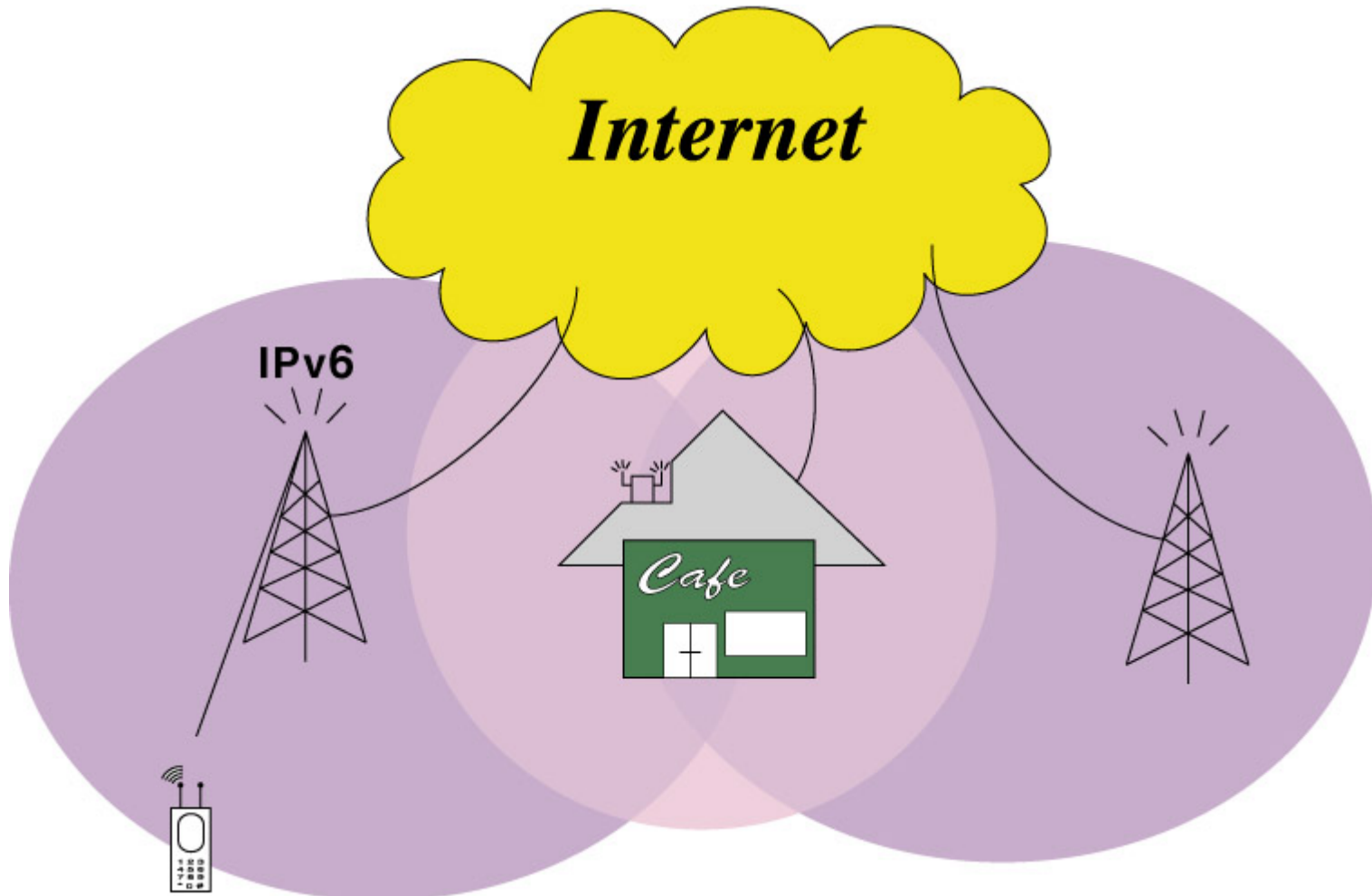
HA intercepts packet for MN

**Neighbor Advertisement**

# Mobile IPv6 Architecture

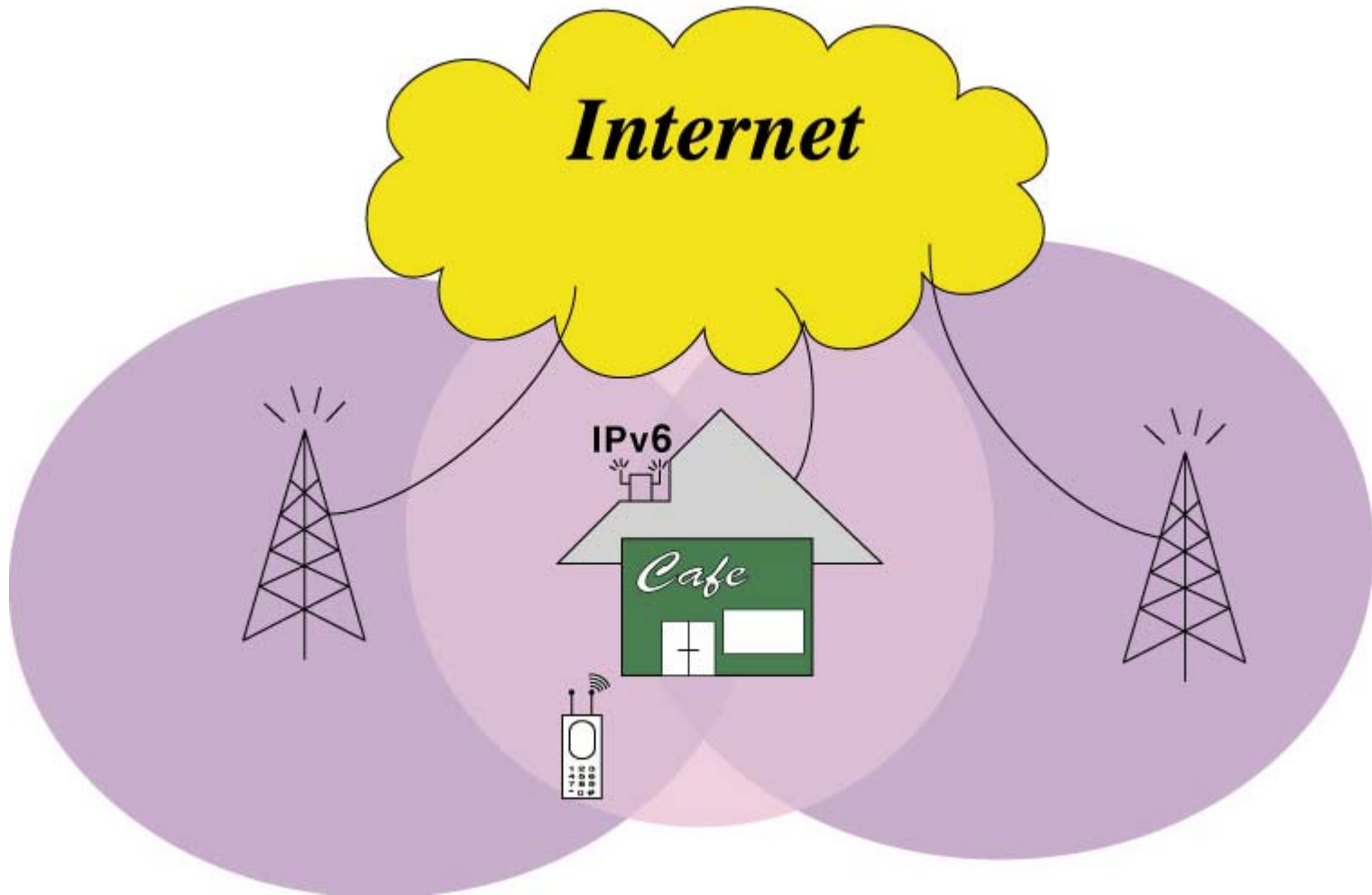


# Seamless Mobility across different medias



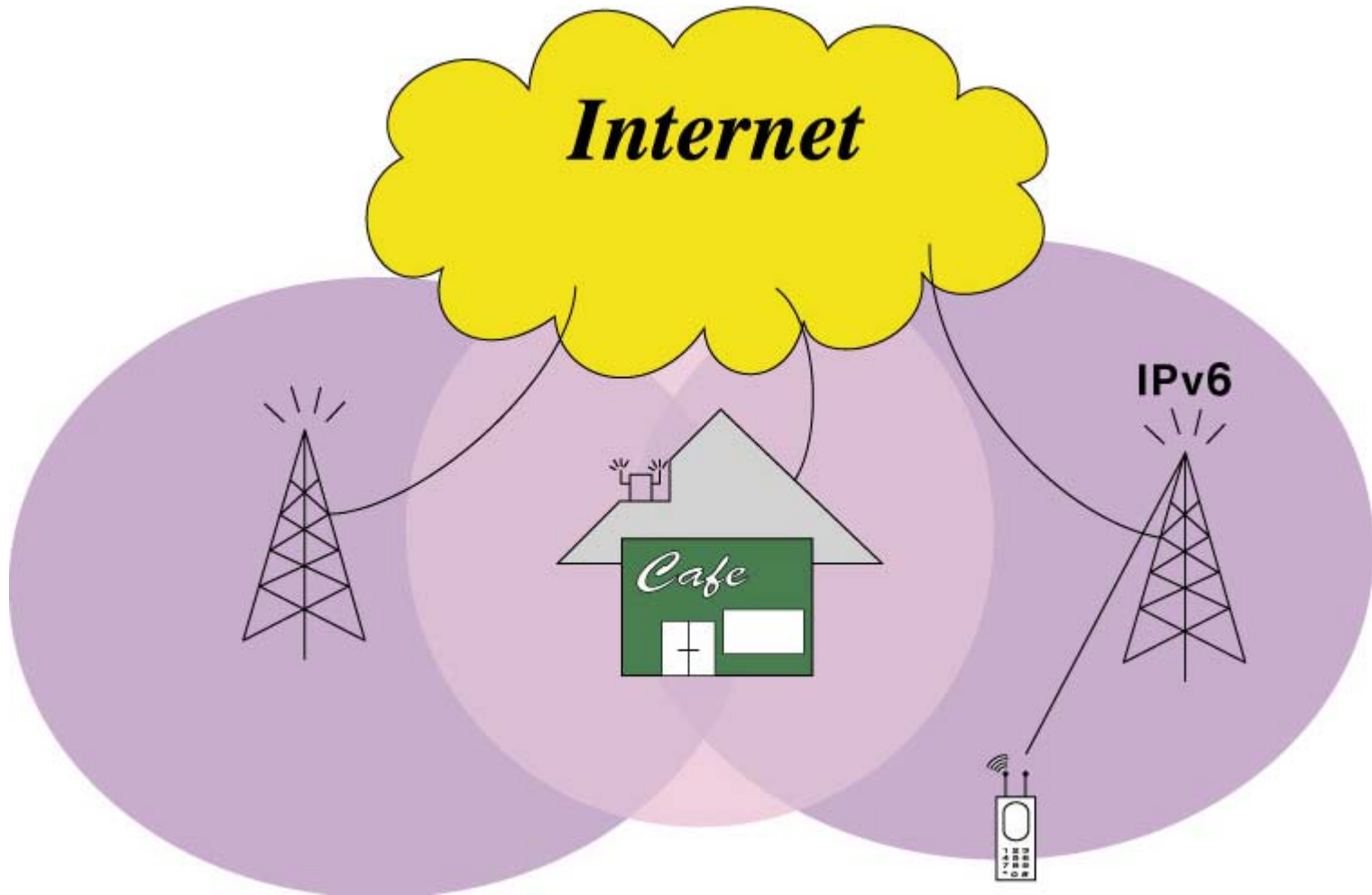
**Independent of access technologies**

# Seamless Mobility across different medias



**Independent of access technologies**

# Seamless Mobility across different medias



**Independent of access technologies**

# Mobile Device Receiving a Connection

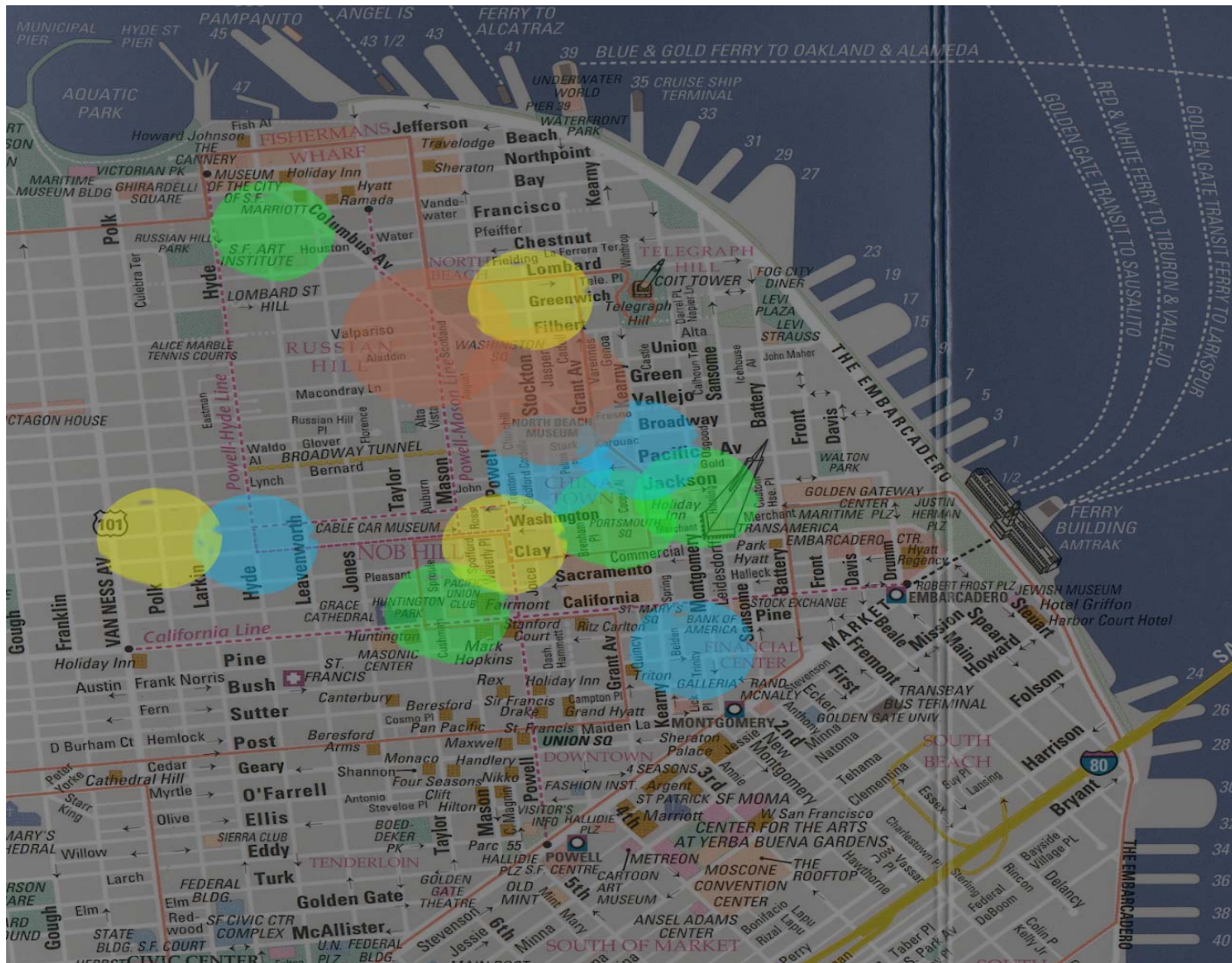
**Push Model**

# Mobile Device as a Server

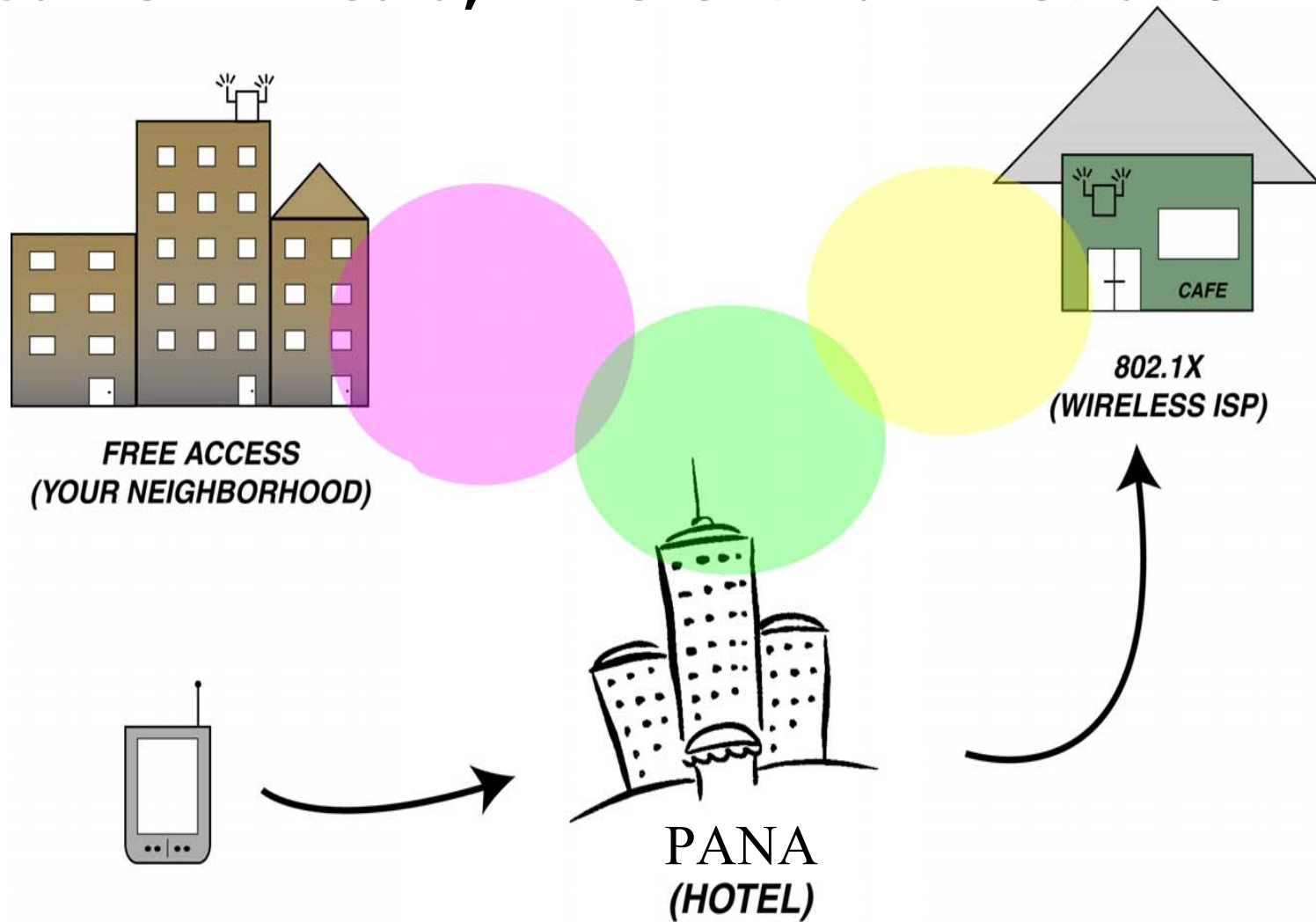
## Pull Model



# Wireless LANs in the city



# Same L2 Media, Different Administration

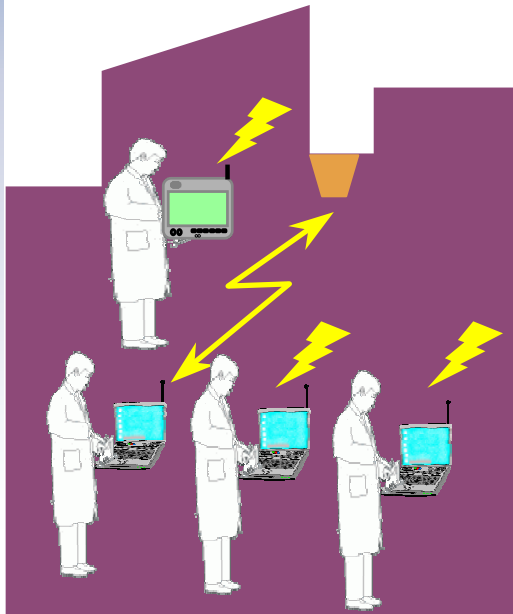


# IPv6 and Wireless Local Area Networks (WLANs)

**IPv6 and Mobile IPv6 enables the wireless future**

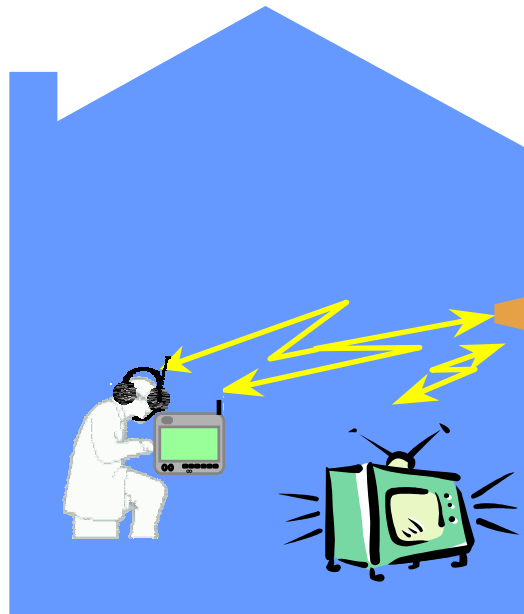
## Untethered connectivity

*Increased capacity  
or reduced cost*



**Office**

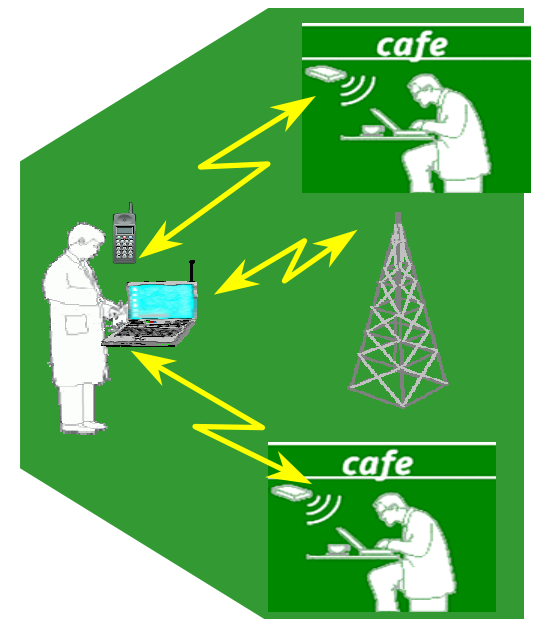
*Multimedia capable*



**School/Home**

## Hot-spot coverage

*WAN / LAN bridge*



**"Hot-spots"**

# IPv6 will provide the needed address space



Future Desktop replacement  
is here today - and it's wireless....

# IPv6 Market Impact

- As wireless operators plan for the deployment of millions of IP devices (phones, cars, PDAs, home appliances...) in the 3<sup>rd</sup> generation networks, the shortage of IPv4 address space is a major impediment in Europe, Asia, and South America.
- By providing globally unique, stable addresses for all Internet Devices, IPv6 is the solution to accommodate the estimated 1 billion subscribers in 2002, and the 24 trillion bits of data that will be exchanged through 3G networks in 2004.

# IPv6 and Mobile IPv6: Full Seamless IP Wireless Access to the Internet

- IPv6 Mobility will enable Radio Access Network parts to become IP access routers and gateways...
  - ✓ Seamless Handoffs
  - ✓ Header Compression
  - ✓ Authentication, Accounting, and Authorization (AAA).
  - ✓ Enhancements to TCP (e.g., PILC working group).
  - ✓ QoS Support
  - ✓ Localized Mobility Management
  - ✓ Mobile Ad-hoc Networking

## IPv6 in 3GPP2

- Statement made by 3GPP2

“All IP in 3GPP2” - is the concept of moving the current wireless network architecture from the current circuit based concept to a packet based architecture utilizing IP protocols and technology where possible.”

IPv6 has been adopted as the IP for this migration step

# IPv6 Internet

- Internet End-to-End Model is restored
  - Allows for new applications and services
  - No Tunnels or NATS – thus reduces operational cost.
  - Internet Access will become more pervasive and thus more users
  - Private Addresses
- End-to-End Security is restored
  - Security is between you and your service provider and your corresponding peers
- Seamless mobility between different access medias – more selection for users and an “always connected” user

**IPv6 : Driving the Wireless Future**



