

# BroadbandInfrastructure

---

## Ways and Means/Broadband Connectivity Meeting

Charles Pittman  
The e-NC Authority  
February 2009

# Broadband & High-Speed Internet

---

**What is Broadband? (& What is Bandwidth?)**

**What are the Technologies that Deliver It?**

**Who are the Service Providers in N.C.?**

# Definition of Broadband & High-Speed Internet

---

**Who defines it?:**

**The Federal Communications Commission**

**Old definition: High-speed Internet**

**Service that provides the subscriber with transmissions at a speed in excess of 200 kilobits per second (kbps) in at least one direction.**

# New Speed Tiers from the FCC

## FCC ORDER

March 19, 2008, FCC Meeting

The FCC issued an order to require broadband service providers to report how many broadband subscribers they have in each Census Tract, broken down by speed and by type of technology. The order requires service providers to categorize both their upload and download speeds according to the defined Tiers of this order.

FCC ORDER ON BROADBAND	
<u>Broadband Tiers</u>	<u>Upload and Download speeds according to eight speed tiers</u>
First-generation Data	200 kilobits per second to 768 kbps
Basic Tier 1	768 kbps to 1.5 megabits per second
Tier 2	1.5 Mbps to 3 Mbps
Tier 3	3 Mbps to 6 Mbps
Tier 4	6 Mbps to 10 Mbps
Tier 5	10 Mbps to 25 Mbps
Tier 6	25 Mbps to 100 Mbps
Tier 7	greater than 100 Mbps.

## Demo Speeds



[www.e-NC.org](http://www.e-NC.org)

# Applicationsfor Broadband

500 kbps - 1 Mbps	Voice over IP Basic Email Web Browsing (simple sites) Streaming Music (caching) Low Quality Video (highly compressed)
1 Mbps - 5 Mbps	Web Browsing (complex sites) Email (larger size attachments) Remote Surveillance IPTV-SD (1-3 channels) File Sharing (small/medium) Telecommuting (ordinary) Digital broadcast video (1 channel) Streaming Music

# Applicationsfor Broadband

5 Mbps - 10 Mbps	Telecommuting (converged services) File Sharing (large) IPTV-SD (multiple channels) Video on Demand SD Broadcast SD Video Video Streaming (2-3 channels) HD Video Downloading Medical File Sharing (basic) Remote Diagnosis (basic) Remote Education Building Control & Management
10 Mbps - 100 Mbps	Telemedicine Educational Services Broadcast Video SD and some HD High Quality Telepresence HD Surveillance Smart/Intelligent Building Control



# Applicationsfor Broadband

100 Mbps - 1 Gbp	HD Telemedicine Multiple Educational Services Broadcast Video full HD Full IPTV Channel Support Video on Demand HD Gaming (immersion) Remote Server Services for Telecommuting
1 Gbps - 10 Gbps	Research Applications Telepresence using uncompressed high definition video streams Live event digital cinema streaming Telemedicine remote control of scientific/medical instruments Interactive remote visualization and virtual reality Movement of terabyte datasets Remote supercomputing



# **What are the Technologies that Deliver Last Mile Broadband or High-Speed Internet?**

---

- **Cable Modem (transmission over coaxial cable, hybrid coax/fiber, fiber)**
- **DSL (transmission over copper)**
- **Fiber (transmission over fiber – can include fiber-to-the-home (FTTH), fiber-to-the-node (FTTN))**
- **PCS (mobile - cell)**
- **Satellite**
- **Wireless (unlicensed/licensed)**



# What is Bandwidth?

---

**Narrowband** – a transmission facility capable of carrying up to and including T-1 (1.544 megabits per sec. symmetrical).

**Wideband** – Transmission facility capable of carrying bandwidth greater than T-1.

**Broadband** – Transmission facility capable of carrying bandwidth greater than 45 Mbps.

# Copper versus Fiber

---

**Copper – Multiple pairs can be combined with electronics to provide multi-megabits of bandwidth. As distance increases bandwidth decreases.**

**Fiber – A single fiber can transport 10 gigabits on one lambda (Wavelength of light).**

## Who are the Service Providers in N.C.?

---

- **ILECs (4)**
- **Independent Telephone Companies (6)**
- **Telephone Cooperatives (9)**
- **Cable Companies (28)**
- **Competitive Local Exchange Companies (?)**
- **Municipal Company (2)**
- **Satellite providers (3)**
- **Wireless licensed/unlicensed**



# Build-out Challenges

---

- **Last mile service**
- **Business case / plus lack of competition**
- **Rural vs. urban disparities.**  
**(More availability in urban areas, prices similar when available)**
- **Industry Trends – triple play, quad play, video competition**

# Broadband Deployment Today & Tomorrow

---

## Broadband by Major Communications Providers:

- AT&T – U-verse (ADSL2+)
- Cable Industry – DOCSIS 3.0
- Verizon – FiOS (FTTH)

See: *Bigger Vision, Bolder Action, Brighter Future;*  
*Capturing the Promise of Broadband for North Carolina and America* at [e-nc.org](http://e-nc.org)

# Broadband Deployment Today & Tomorrow

---

- Independents, cooperatives and public broadband providers are deploying high-capacity network generation networks, but there are not enough of them to have a major impact on the United States as a whole.
- Wireless cannot provide as much bandwidth capacity as fiber but, in some cases, may be a better choice than DSL or cable modem service.
- Broadband over power lines will not offer high-capacity broadband in the foreseeable future
- The satellite broadband available in the United States is not a solution.
- Various state initiatives are likely to increase broadband deployment and adoption, but most of these initiatives are focusing on low-capacity broadband that will not meet America's needs in years ahead.



# FTTH Deployment

---

**ATMC – deploying fiber to the home in the greenfields in Brunswick County.**

**Skyline TMC**

**Star TMC – greenfields in Sampson County.**

**Surry TMC is deploying FTTH in Surry County.**

**Wilkes TMC is deploying FTTH in Wilkes County.**

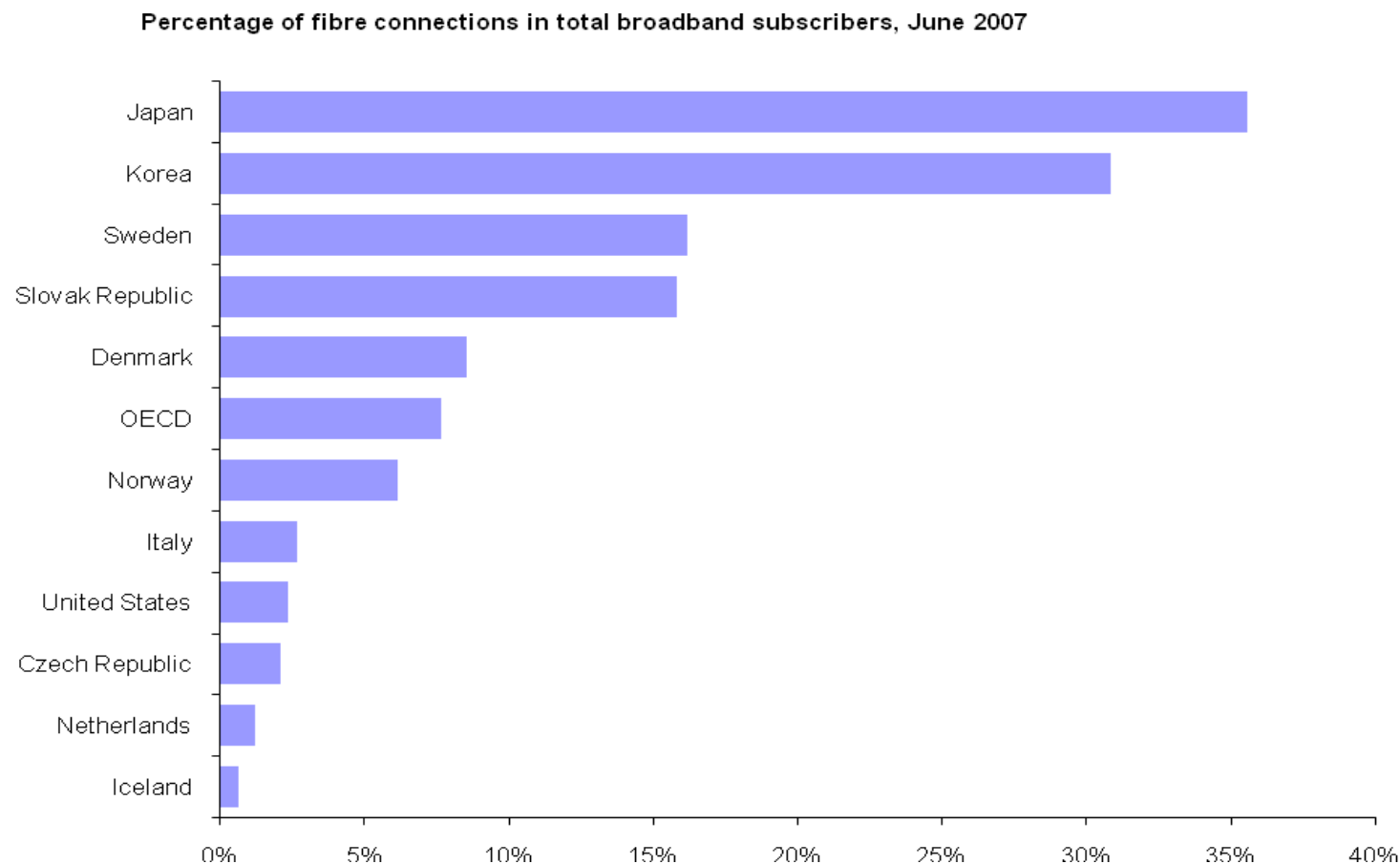
**Yadkin Valley TMC – deploying FTTH.**

**City of Wilson – FTTH**

**Salisbury – Planning stage.**



On fiber connections as a percent of total subscribers, the US ranked 9th among the OECD nations as of June 2007:

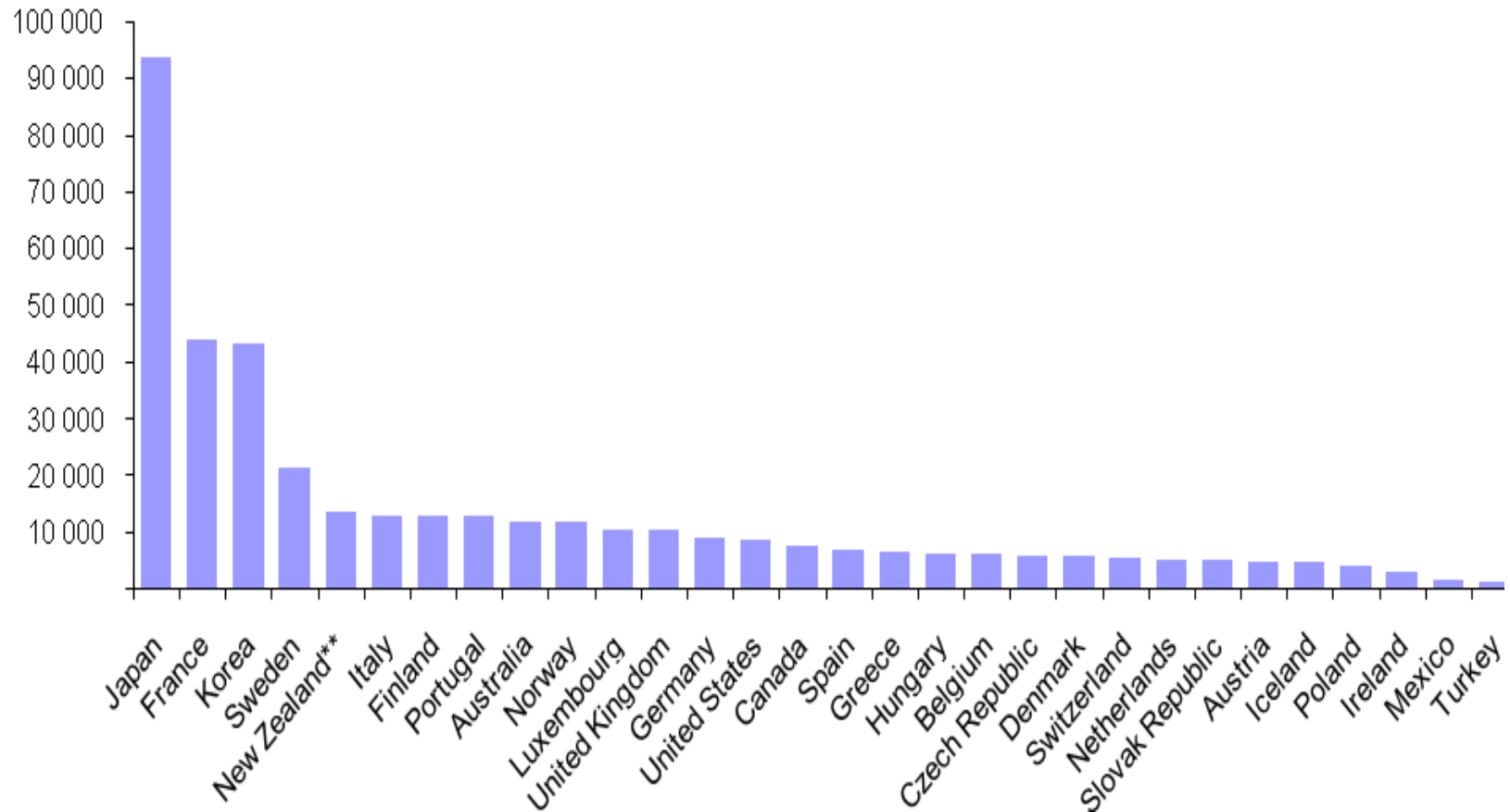


OECD, *Percentage of fibre connections in total broadband (June 2007)*,  
<http://www.oecd.org/dataoecd/21/58/39574845.xls>



On average advertised download data speed, the United States ranked 14th among OECD nations as of October 2007:

Average advertised broadband download speed. by country. Mbit/s. October 2007



OECD, *Broadband Average Advertised Download Speeds* (October 2007),  
<http://www.oecd.org/dataoecd/10/53/39575086.xls>.

# The Real Issue

---

- **Approximately 600,000 households in North Carolina do not have any high-speed Internet access available.**
- **Mapping the un-served areas is important, but not nearly as important as providing high-speed Internet access to the students, households and communities that don't have service. These people don't need a map. They know they don't have access.**

# Who Needs High-Speed Internet?

---



[www.e-NC.org](http://www.e-NC.org)

# What Can We Do to Increase Availability?

---

- Help increase the understanding of citizens and leaders of what broadband is, and of deployment issues.
- Increased digital literacy in communities, and an increased understanding of the benefits of broadband – means a likely increase in demand (and hopefully supply)
- Review the reports on our Website, at e-nc.org:  
Bigger Vision, Bolder Action, Brighter Future;  
Capturing the Promise of Broadband for North Carolina and America and Capturing The Promise – e-NC Internet Action Plan.

To ReachUs ....

---



*Connecting  
North Carolina  
to a Better Future*

**The e-NC Authority**  
**4021 Carya Drive, Raleigh**  
**1-866-627-8725**  
**[www.e-nc.org](http://www.e-nc.org)**

