MINUTES OF THE HOUSE ENERGY AND UTILITIES COMMITTEE

The meeting was called to order by Chairman Carl Holmes at 9:00 A.M. on February 7, 2011, in Room 785 of the Docking State Office Building.

All members were present except:
    Representative Stephen Alford-excused
    Representative Nile Dillmore-excused
    Representative Stan Frownfelter-excused
    Representative Phil Hermanson-excused
    Representative Don Hineman-excused
    Representative Annie Kuether-excused
    Representative Richard Proehl-excused
    Representative Joe Seiwert-excused
    Representative Mike Slattery-excused
    Representative Vern Swanson-excused

Committee staff present:
    Cindy Lash, Kansas Legislative Research Department
    Renae Hansen, Committee Assistant

Presentation:

    Mike Scott, AT&T and Steve Hahn, AT&T Kansas president, took the committee on a tour of the AT&T facilities on 9th and Jackson. Mr. Scott and Mr. Hahn spent time explaining to the committee (Attachment 1) how the cell phone technology works. Those present toured the building.

Questions were asked and comments made during the tour.

The next meeting is scheduled for February 8, 2011.

The meeting was adjourned at 10:35 A.M.

How a Wireless Network Works

Steve Hahn and Mike Scott
AT&T Kansas

February 7, 2011
Kansas House Energy and Utilities
Committee

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There are 5 Fundamental Components of a Wireless Network

- Wireless device
- Cell site
- Radio spectrum
- Backhaul transmission facilities
- Wireless switch

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Wireless Device

- Could be a phone, a PDA like an iPhone or Blackberry, a laptop card, a Netbook, etc.); they are, in reality, small sophisticated two-way computing devices that are capable of transmitting and receiving radio signals.

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Cell Site

1-4

- This is any location that houses antennas and radio equipment

- Is usually a tower or monopole, but can be on a roof top, on the side of a building, on a water tower, or inside a building like an airport terminal

- The tower/structure supports the antennas and a hut on the ground holds the radio equipment.

- The cell site communicates via two way radio signals (using radio spectrum) from the wireless device to the triangular antenna arrays on the tower which, in turn, are connected to the radio equipment in the hut at the base of the tower via thick coaxial cables that can often be seen running down the tower.

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Examples of Cell Towers

AT&T Wireless Tower
Chelmsford, MA

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Cell Tower with Microwave Backhaul

Not Just Towers.......

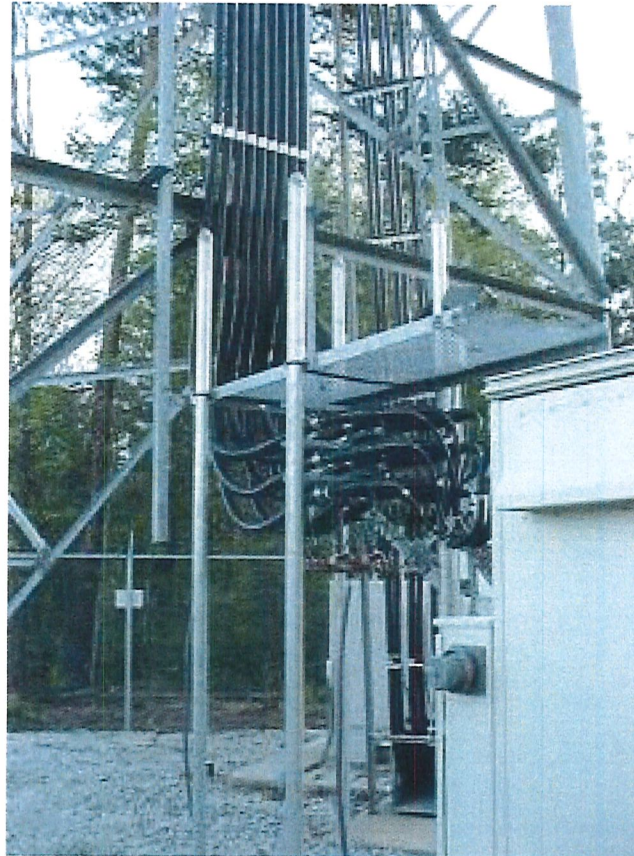# Not Just Towers.......

We Also Disguise Them....

We Also Disguise Them....

410-136, Stealth Flagpole at Shipyard Plantation on Hilton Head

Coaxial Cables From Cell Site Antennas to Equipment Hut

Different Types of Equipment Huts (they house the radio equipment)

Radio Spectrum

- Provides the wireless link between the device and the cell site's antennas. In many cases, this may be the ONLY portion of the call that is actually "wireless".

- The remainder of the wireless call may be handled by wireline facilities such as fiber and copper transmission networks, or by microwave radio.

- Various frequencies used in providing wireless service (e.g., 850 MHz, 1900 MHz, 700 Mhz, etc.)

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Backhaul

- The cell site is connected to the wireless switch over facilities that "backhaul" wireless voice and data from the cell site to the switch.

- These backhaul connections are usually wireline circuits, but also may be high capacity point to point wireless microwave links. In fact, the use of wireless backhaul is expected to increase substantially over the next couple of years.

- Historically, wireline backhaul circuits have been copper facilities. However, wireless carriers are currently upgrading these facilities to fiber with Ethernet or IP based connectivity.

- These upgrades will allow carriers to better handle the increased data traffic demands from the growing number of smartphone, laptop, and Netbook users.

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Wireless Switch

- Contains the computing brains and performs the task of connecting the wireless device to other wireless or landline devices.

- Authenticates the call attempt and routes it to the appropriate destination.

- Monitored 24 hours a day.

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Wireless Switch

Registration

- When a wireless device is turned on, it periodically "registers" with the wireless network.

- This enables the network to deliver voice calls or data requests to the mobile device faster and more efficiently by knowing where within the network the device is located.

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Making a Wireless Voice Call

- When the wireless user dials a number and presses the "SEND" key, the device sends a radio signal to the nearest cell site's antennas where the signal is delivered to the radio equipment at the base of the tower via coax cables.

- The signal is then transmitted to the wireless switch via the backhaul transmission facilities.

- The switch processes the information being sent by the wireless device, validates the customer's telephone number and other info, and then enables the connection from the wireless caller to the destination of the called number.

Receiving a Voice Wireless call

- The wireless switch receives the incoming call and then needs to locate the wireless user.

- It does this by accessing a database that has the last known general location of the wireless user based on the last "registration".

- Once it has narrowed the search for the wireless user, the switch sends out a unique paging signal that only the called wireless device can "see".

- Once the wireless device recognizes the page and automatically responds back to the network, the wireless switch enables the communication path from the calling number to the wireless device.

Handoffs from Cell Site to Cell Site

- When a wireless caller is traveling by car or train and on a call, the wireless network <u>and</u> the wireless device constantly monitor the quality of the call and compare it to how the call may be handled by surrounding cell sites.

- The wireless device and the switch make decisions to hand a call to the neighbor cell site if the call quality on the serving cell site starts to degrade.

- The determination of call quality and hand off to different sites happens automatically and is transparent and seamless to the wireless user.

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Data Sessions (SMS, MMS, Internet Browsing, etc.)

- The connection of the wireless device to the cell site is the same, but the data session is routed to a data switch, which is the equivalent of the switch for voice calls, which then routes the data session to a commercial internet server to establish and connect the data session request.

ANTENNAE

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COAXIAL CABLE

D "BACKHAUL" TRANSMISSION
FACILITIES (typically wireline)

TO THE PUBLIC SW
TELEPHONE NETW

HUT WHERE RADIO
EQUIPMENT RESIDES

A WIRELESS DEVICES

C CELL SITE

E WIRELESS SWITCH