The Wireless Response to Catastrophic Disasters

Brian K. Daly

WB7OML

Who am I?

- Brian Daly
  - Professional
    - Director, Core Network Standards, Cingular Wireless
    - MS in Electrical Engineering from Arizona State University
      - Communication Systems
      - Electromagnetic Engineering
      - Microwave Engineering
    - 23 years in telecomm (wireline & wireless)
  - Amateur
    - WB7OML, first licensed in 1977
    - EC, King County, Western Washington Medical Services Team
      - Former EC for Maricopa County, Arizona
    - Emcomm Level 1,2 & 3 (Certified Instructor)
    - SKYWARN
  - FEMA C.E.R.T. Instructor
  - wb7oml@arrl.net

The area in lower Manhattan where the World Trade Center was located was the "most telecom-intensive square mile in the world," said Michael Morrissey, vice president-law and government for AT&T Corp.

Verizon Communications provided 300,000 voice lines and served 14,000 businesses from its World Trade Center area office

The New York Times **Business**

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COMMUNICATIONS

Millions Said to Be Lacking Phone Service of Any Kind

By KEN BELSON
Published: September 1, 2005

Efforts to get food, water and electricity to the hundreds of thousands of survivors of Hurricane Katrina have been hampered by a lack of an essential tool: the ability of aid groups, citizens and the phone companies to communicate with one another.

TELECOM REPORT

Why wireless calls can fail in disaster

Landlines are key; can engineers plan for 'apocalypse'?

By Jeffry Bartash, MarketWatch
Last Update: 12:01 AM ET Sep 17, 2005

WASHINGTON (MarketWatch) -- When a major disaster strikes, wireless phones don't always work.

Thousands of customers found that out the hard way after Hurricane Katrina devastated large swaths of the Gulf Co
though less widespread, interruptions afflicted the New York City area after the Sept. 11 attacks.

USA TODAY

Storm hampers long-distance, cell services

By Anick Jesdanun, The Associated Press

Cell phone service was spotty and long-distance callers met busy signals on Monday as Hurricane Katrina knocked out key telecommunications hubs along the Gulf Coast.

Christopher Magee, 16, of New Orleans, captures images with his phone blown-out hotel windows from Katrina.

By Gary Coronado, The Palm Beach Post via AP

Most long-distance and cellular providers reported trouble, while the dominant local phone provider for the hurricane zone, BellSouth Corp., did not immediately quantify the extent of storm-related service disruptions.

Sprint Nextel Corp.'s long-distance switch in New Orleans failed soon after the storm hit, meaning no long distance call could be placed into or out of the area, said company spokesman Charles Fleckenstein. Customers who tried got busy signals or recordings informing them that all circuits are busy, he said.

He attributed troubles to flooding and power loss.

On 9/11, the telecommunications infrastructure in downtown Manhattan went down, causing long-term outages to 300,000 telephone lines and 3.6 million high-capacity data circuits

9-11-2001

WERT ...

Wireless Emergency Response Team

... using wireless technology to save lives.

- WERT was established on the night of 9/11
  - provide coordinated wireless industry mutual aid support for the Search and Rescue effort for possible trapped survivors in the World Trade Center rubble
  - no trapped survivors were found
- WERT response to 9/ 11 demonstrated that wireless communications can be a highly valuable resource for future Search and Rescue needs
- Final Report for the September 11, 2001 New York city World Trade Center Terrorist Attacks (October, 2001)
  - 134 Key Learnings and 23 Recommendations

WERT ...

Wireless Emergency Response Team

... using wireless technology to save lives.

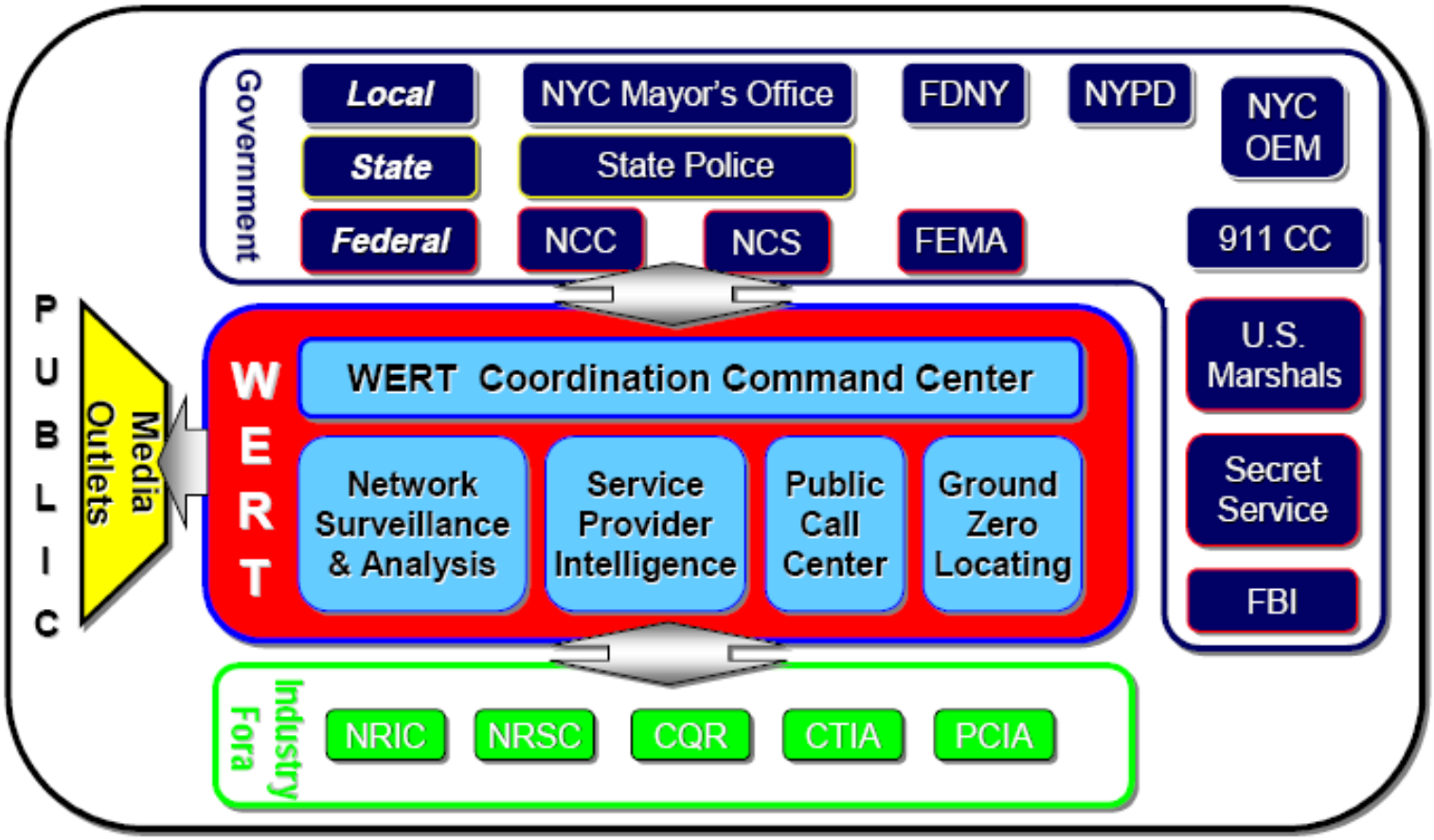
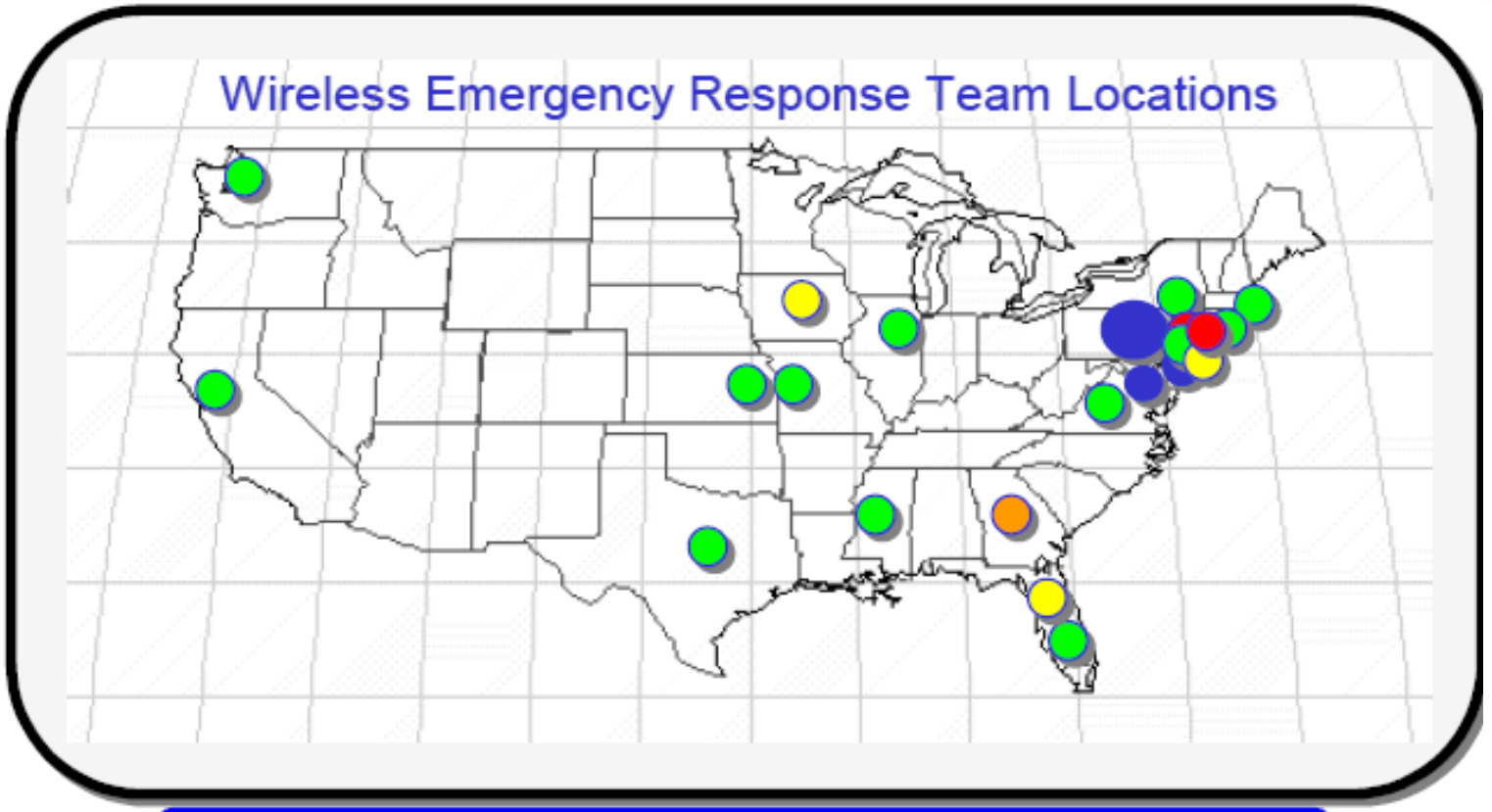


Figure 1. WERT Structure and Interfaces



- Coordination Command Center
- Network Surveillance & Analysis
- Service Provider Intelligence
- Public Call Center
- Ground Zero Locating

WERT ...

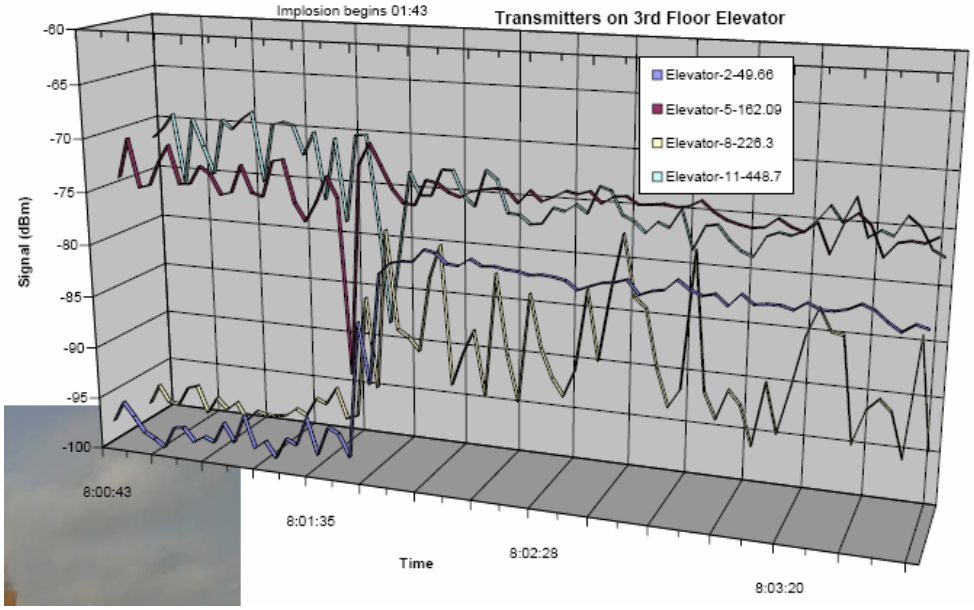
Wireless Emergency Response Team

... using wireless technology to save lives.

- Major communications companies should have a contingency plan to offer a public call center for a mutual aid national crisis
- Consider how mobile phones and pagers could operate during an emergency so as to maximize chances of locating survivors while minimizing power consumption
- The NCS / NCC, along FEMA, should conduct an annual test in which the WERT capability is tested
  - The test should consist of a simulated condition that adequately exercises WERT procedural and technical capabilities
- SMS and two-way pagers send messages using very few resources on the radio spectrum
  - may not have been able to place calls because of radio channel blocking, but were in general able to send SMS messages
  - 9-1-1 equivalent on SMS?

Better Understand Propagation in Collapsed Structures…

- NIST placed transmitters in structures that were to be imploded
- Measured signals before and after


Implosion begins 01:43
Transmitters on 3rd Floor Elevator
Elevator-2-49.66
Elevator-5-162.09
Elevator-8-226.3
Elevator-11-448.7
Signal (dBm)
-60
-65
-70
-75
-80
-85
-90
-95
-100
8:00:43
8:01:35
8:02:28
8:03:20
Time

July 7, 2005
London Bombings

Telecom Impacts

- High-speed Internet services and voice-over IP phones weren't affected by the increased network traffic volumes
  - European email traffic doubled within an hour after the attacks began
- Most UK cell carriers experienced significant amounts of network congestion
  - at least twice the normal daily call volume
  - Vodafone said in a statement: "Our London switches are at capacity (which is very rare) so we are having to go into 'access overload' procedures which means freeing up a proportion of the capacity across London to ensure that the police and emergency services can communicate."
  - A spokesman for O2 said: "There is no damage to our network but there is congestion in some areas which we are working to overcome."

Cell Phone Outages

- Why?
  - service being temporarily disabled by the authorities due to concerns over their possible use as trigger devices
    - Madrid experience
    - Service turned off not only in London….
  - due to the sheer volume of usage

One Impact to Privacy..

- Current EU Data Protection …
  - ISPs and Telco operators must immediately delete data not required for billing purposes
- Post London Bombings..
  - Law enforcement wants mandatory storage of records for several years…just in case!
  - Minimum 6 months…to 2 years
  - Cell ID & location, IMSI, IMEI, Prepaid info

Terrorist Attack Impacts to Telecom

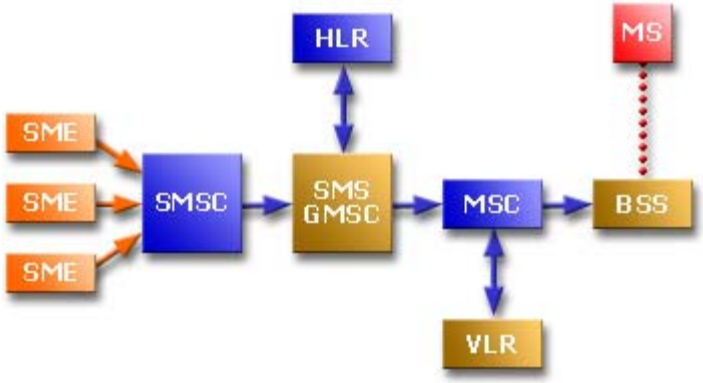
- Mobile phone networks experience a surge in demand in the immediate aftermath of a terrorist attack
  - some calls are made by and to emergency responders/9-1-1
  - Others are for sharing information about what is happening
  - many will be to check on loved one’s safety

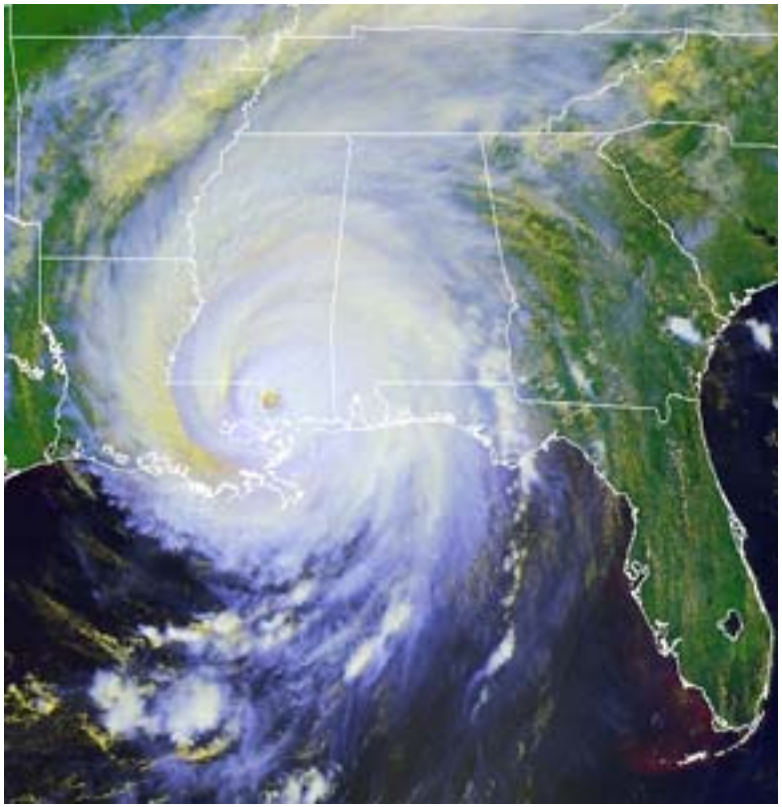
Camera Phones…

- London Bombs - was the first event involving large numbers of people carrying camera phones
- People caught up in the blasts emailed pictures to TV stations
- Mobile video footage provided by eye-witnesses was aired on TV within half an hour of the explosions
- The BBC received more than 300 emails containing
  - 900 still images on the day of the attacks
  - 50 within an hour
  - 22,000 text messages describing what was happening
- Raises issues about authenticity and privacy
- The Metropolitan Police in London requested that members of the public send in all the images they had taken in the aftermath of the London attacks, as part of their evidence-gathering process

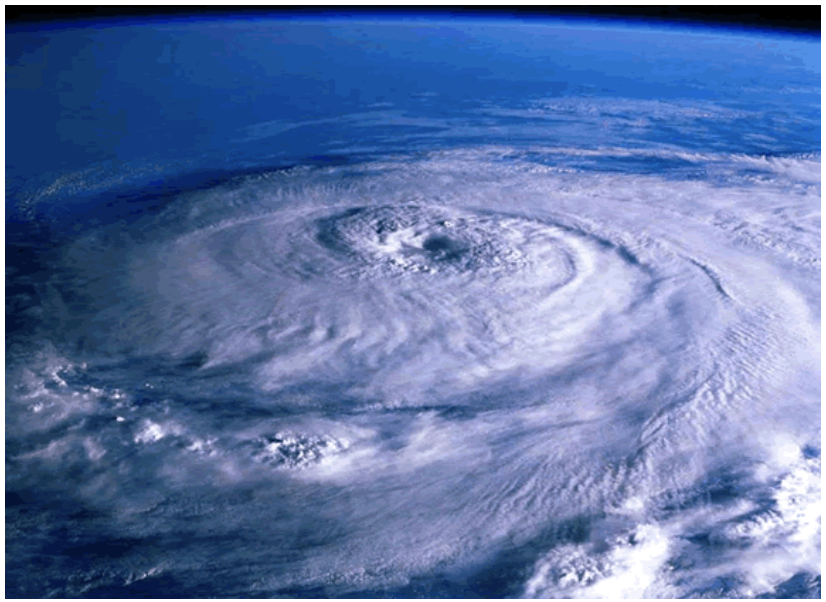
SMS Not as Prone to Congestion..

- Uses less radio resources than voice
- Sent on shared control channel, not a dedicated channel





Katrina
2005



Katrina Impacts to Telecomm..

- Knocked out more than 3 million customer phone lines in the Louisiana, Mississippi, and Alabama area
- Wireline telecommunications network sustained enormous damage both to the switching centers that route calls and to the lines used to connect buildings and customers to the network
- Local wireless networks also sustained considerable damage –
  - more than a thousand cell sites were knocked out of service
- During this disaster, millions of telephone calls simply were not able to get through
  - Over 20 million telephone calls did not go through the day after the hurricane hit.
- Thirty-eight 9-1-1 call centers went down
- Of the 41 broadcast radio stations located in New Orleans and the surrounding area, only two AM and two FM stations remained on the air in the wake of the hurricane
- Hundreds of thousands of people were unable to receive news and emergency information, contact emergency responders, or communicate with their loved ones

- “There is major damage,” said Cingular spokesperson Dawn Benton. Extensive commercial power outages throughout the region took down cell sites. Debris and extensive flooding are preventing efforts to restore the service.

- “Last year, The 9/11 Commission Report described a state of communications unreadiness that seriously hindered our country’s ability to respond to that attack. But it also described a chilling picture of communications unreadiness three years later—and Hurricane Katrina has shown that to be still tragically true. Now people are talking again about the need for full-scale emergency planning. This time we dare not fail.”

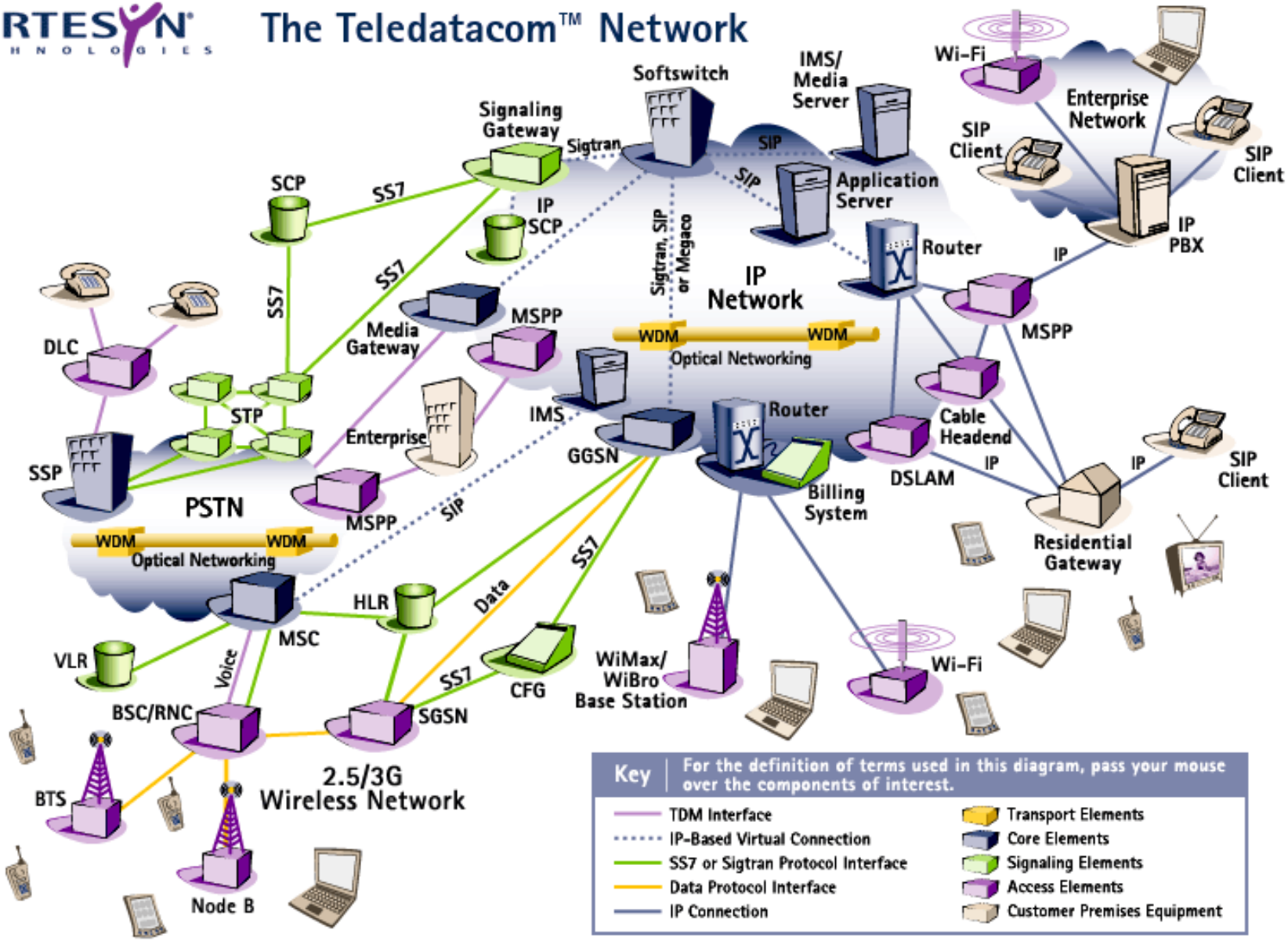
COMMISSIONER MICHAEL J. COPPS
FCC FIELD HEARING
ATLANTA, GEORGIA
SEPTEMBER 15, 2005

Understanding the Wireless Communications Technology

- To understand why these systems fail, let's first look at the architectures for various communications systems:
  - Wireline
  - Cellular wireless
  - Internet
  - Satellite wireless

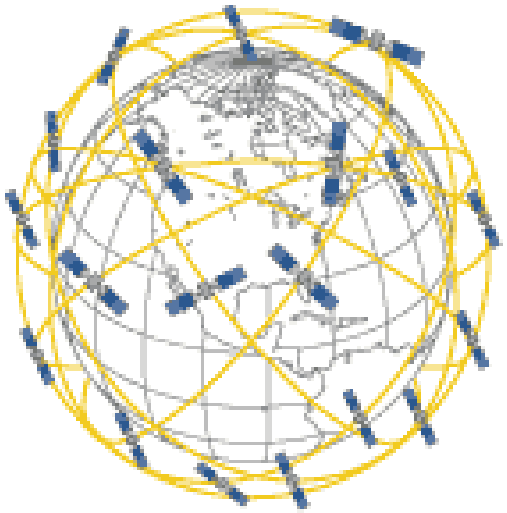
"E-mail, voice mail, web pages, stock quotes, news, banking...that's a lot of responsibility for such a little guy!"

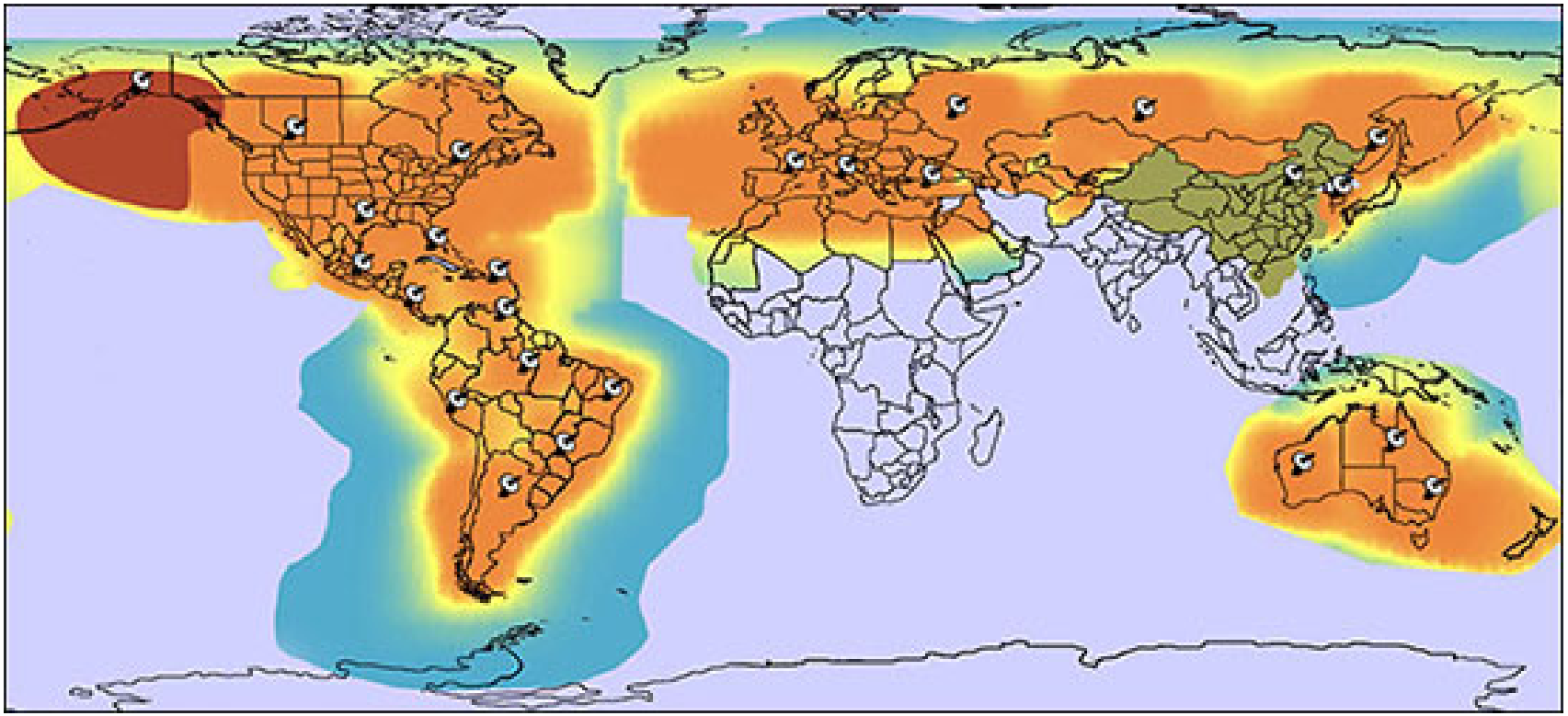
The Teledatacom™ Network



Satellite

- Satellite service providers helped bridge some of the gaps left by the outages
  - providing satellite phones and video links to law enforcement officials, medical personnel, emergency relief personnel, and news outlets





Globalstar Gateway

Primary Globalstar Service Area

Extended Globalstar Service Area
(Customers may have single satellite coverage and experience a weaker signal)

Fringe Globalstar Service Area
(Customers may experience weak or sporadic signals)

Globalstar Service Area currently unavailable to North American roamers

Coming in 2006, subject to government approval,
expanded and improved service coverage area.

Coverage may vary, Map denotes coverage for Direct Dial-Up data calls only.

www.globalstarusa.com

Satellite Lessons Learned

- Satellite is part of the solution
- When the terrestrial telephone and broadcast networks went down, satellites worked
  - XM Satellite Radio and DirecTV provided FEMA and the Red Cross with a 24/7 dedicated broadcast station for disseminating hurricane-related information to first responders and the general population
- Equipment should be in place before the disaster
- The day after Katrina hit, satellite installation and repair crews were ready to begin restoring communications
  - Unfortunately, too many of these professionals couldn't get permission from officials to enter the area

Source: Satellite Industries Association

Power is the Key…

- “Many of Sprint's cell towers in the New Orleans area switched to batteries or generators but could not be recharged because crews could not reach them, Fleckenstein said. Some towers stopped working completely by early afternoon, and many more were expected to fail as power loss continues, he said.”
- “Cellular provider Cingular Wireless also reported service interruptions in the coastal communities of Mobile and Baldwin, Ala., because of power outages. Cingular also had problems in New Orleans, Baton Rouge, and Biloxi, Miss.”
- “Cingular said it had distributed more than 500 emergency generators, placed 240,000 gallons of fuel in them or on standby and had 25 teams ready to deploy to replace and refuel the generators once conditions are safe.”

Source: USA Today, http://www.usatoday.com/tech/news/2005-08-29-telecom-issues-katrina_x.htm


45-70-416779
MQ POWER
NationsRent
70
Denyo
MQ
POWER
DANGER
HIGH VOLTAGE
NationsRent

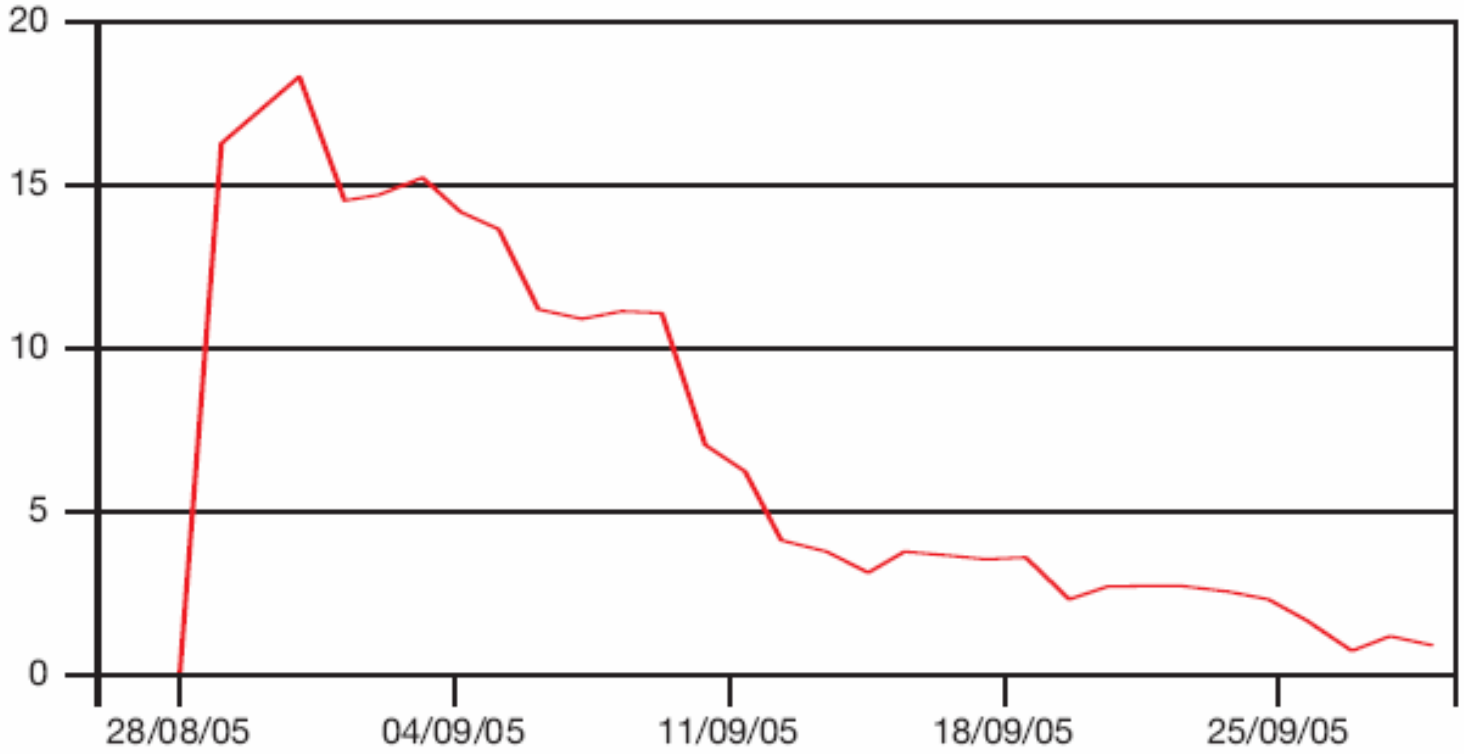
Lakeland, Fla - Cingular Wireless prepares for Hurricane Wilma
by loading portable generators onto trucks.
The company has some 330 portable generators standing in
case the storm hit Florida


cingular
WIRELESS
Emergency Response
F450


cingular
WIRELESS

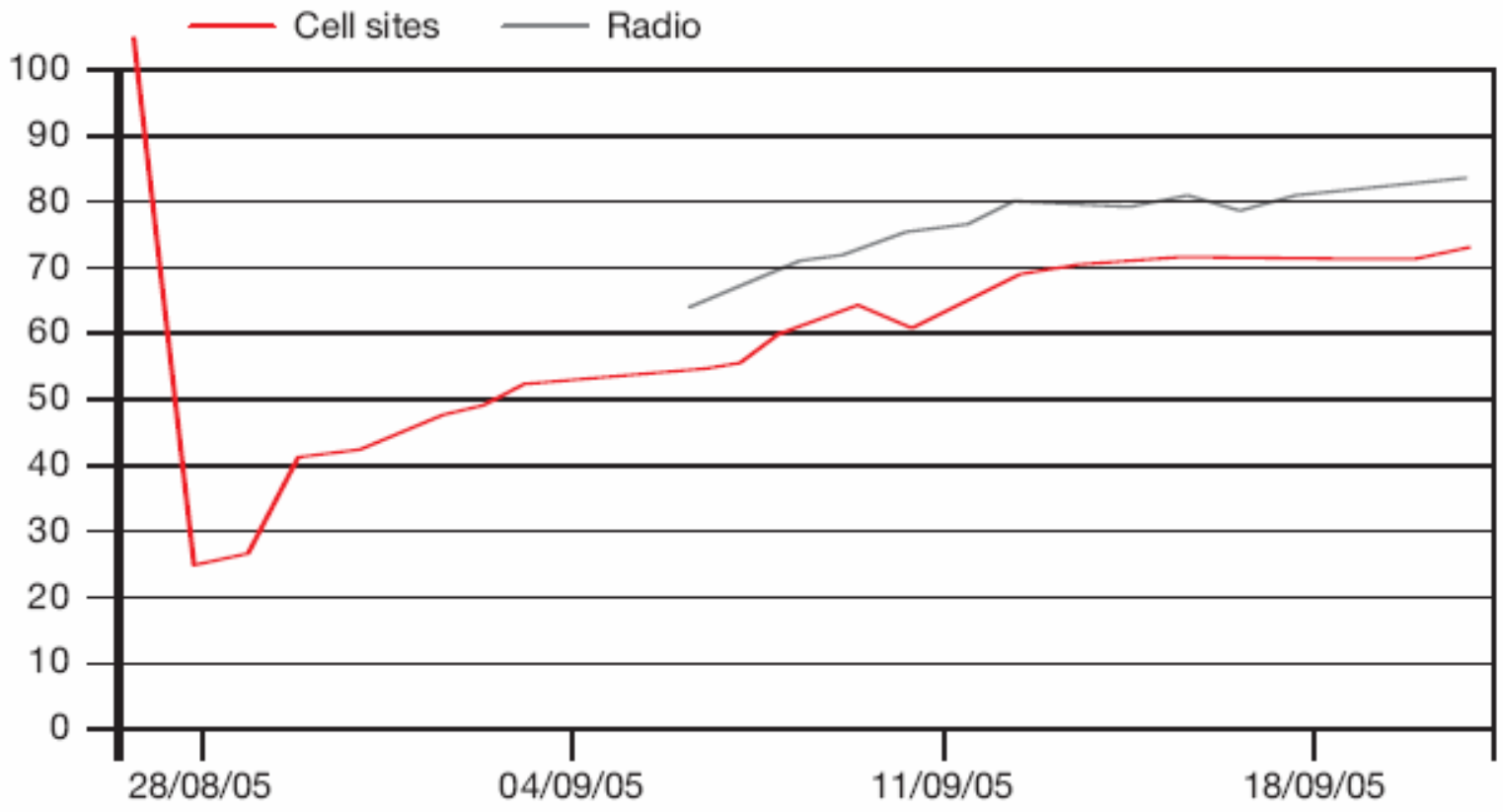

EMERGENCY 911
DISASTER RESPONSE
MOBILE COMMAND
CENTER

Post Katrina Failed Calls, millions



Source: FCC

Cell Site & Radio Restoration



Source: FCC

Cingular's Impact from Katrina

- Lost about 85 percent of the network in the hardest hit areas
- Primary network-affecting events were split between:
  - physical damage (20 percent) to facilities
  - damage to the additional infrastructure that Cingular depends on for power and connections (80 percent)

Cingular's Impact from Katrina

- Though Cingular builds towers to withstand winds of 200 miles per hour, that does not make them invincible to the "debris-missiles" launched by 150 mile per hour wind

Cingular's Impact from Katrina

- As bad as the damage from wind and debris was, the most significant single hit that Cingular's network took came when the levees broke and one of the two core switches in New Orleans became completely submerged

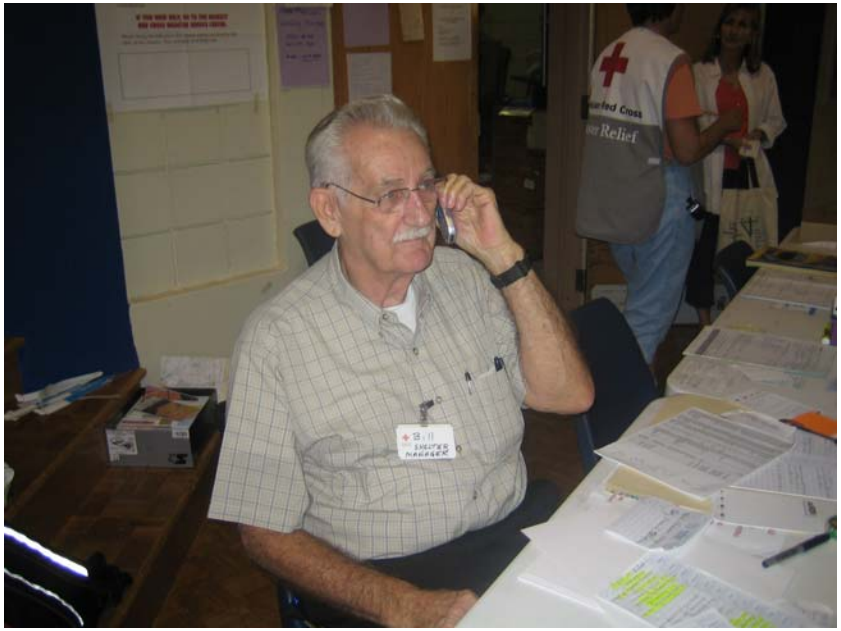
Cingular's Response to Katrina

- First Response
  - set up staging areas to support Cingular's employees and to restore service
  - initial deployment:
    - 500 portable generators
    - 800,000 gallons of fuel
    - 1,000 service personnel
    - more than 30 portable cell sites called COWS
    - first of a new breed of devices called satellite COLTS
  - in some instances Cingular was among the first responders in heavily-damaged communities …


HURRICANE
EMPLOYEE
RELIEF
HOTLINE
800 345 6211

Cingular's Response to Katrina

- In some cases Cingular provided support to other first responders in the area
- These joint efforts included:
  - setting up a generator at Trent Lott Airport and restoring power so the airport could support emergency flight operations
  - providing fuel to police and other emergency personnel



Making 230 satellite phones and more than 3,500 other wireless phones with Wireless Priority Service to other first responders

Cingular's Response to Katrina

- Within three weeks of Katrina's landfall in Louisiana, Cingular had restored geographic coverage in New Orleans to 92 percent and in Biloxi to 97 percent
- But geographic coverage is not the same as capacity..
  - Overall capacity of the network was a bit further behind
  - September 19: combination of physical damage to 68 cell sites and the disruption of the wired networks in New Orleans and Biloxi => the network was functioning at 75 percent of capacity in New Orleans and 100 percent of capacity in Biloxi
  - But in Biloxi, where wireless is the sole means of communication for many people, call volumes were at 140 percent of capacity; and people were still experiencing some blocking as Cingular added additional capacity

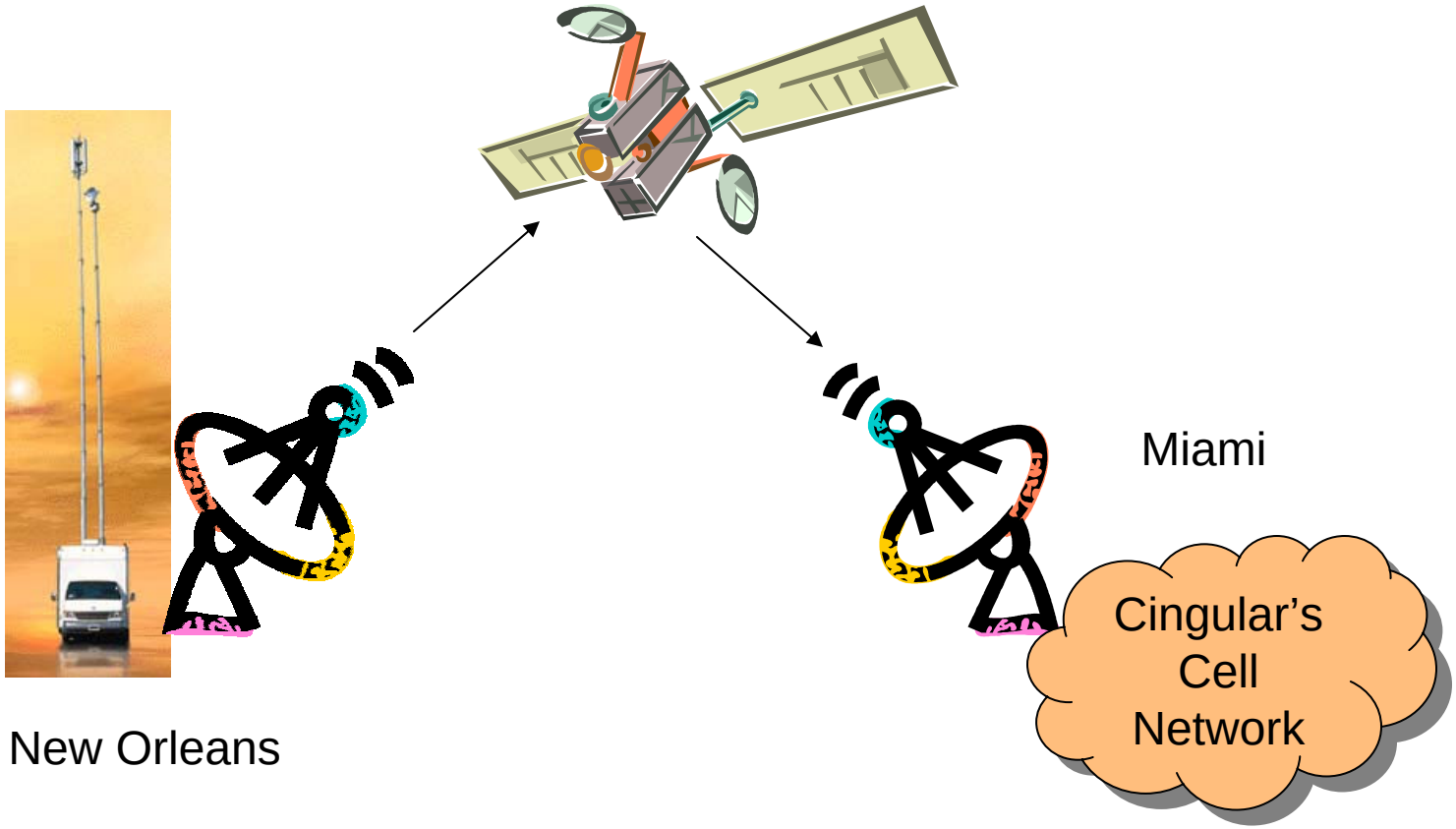
Cingular’s Response to Katrina

- To respond to Hurricanes and other natural disasters Cingular Wireless developed and implemented response and recovery strategies to ensure restoration of networks and services
  - Network Operations Centers track outages to determine probable causes and possible remedies
  - After the "all clear" is sounded, the first priority is ensuring all employees are safe and accounted for
  - Network SWAT team engages its time-tested recovery processes 24/7
  - Cingular’s network team continues to restore service in record time

Cingular's *Project Pegasus*

- Pegasus is Cingular's vision of a way to increase the scope and deployment of portable, satellite, cell sites (satellite COLTS) in an emergency
- These COLTS are portable cell sites with satellite connectivity mounted on light trucks.
- They can be driven or flown in to a disaster area. They work with any Cingular GSM phone enabling victims and first responders to use their existing phones during a crisis.
- These COLTS provide a satellite connection to any of our operational switches, become operational in a matter of hours, and require no commercial power or wired network infrastructure.

Project Pegasus




cingular

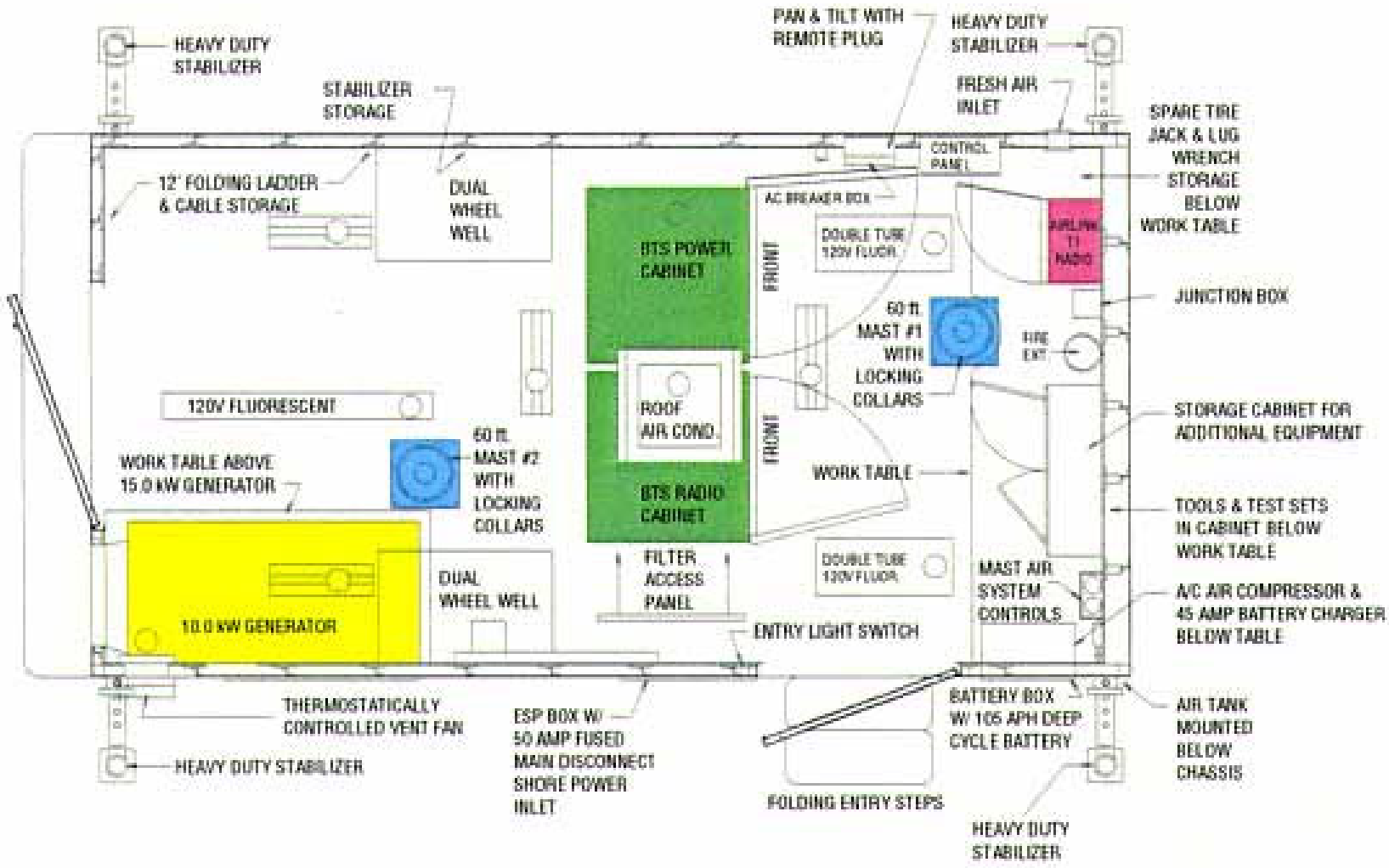
CIAB
Cell-in-a-box

COWs
Cell on Wheels

30,000 BTU's of HVAC
On Board 12.5kW generator
and UPS power supply
Supports locking collar masts to 60'

COLTs
Cell on Light Truck

E-N-G's Cell-Sites-on-Wheels are expertly integrated with everything you need for rapid deployment and reliable field service.



Example COLT Floor Plan

FCC Actions…

- Special Temporary Authorities (STAs) are generally granted only for emergency situations, such as natural disasters, for restoration of communications or other short term operations
- The FCC received at least 22 STA requests and 77 requests for temporary frequency assignments in the first days of the disaster
- The Commission also received a number of requests for temporary waiver of its rules
- The Commission granted each of these requests within 4 hours of receipt of all necessary information from the requestor
  - except in instances requiring coordination with other government agencies where requests were granted within 24 hours

Some examples of STAs..

- On September 2nd, the Commission granted STAs to operate ultra-wide band services “through-the-wall” imaging systems to locate survivors
- On September 5th, the Commission temporarily authorized the Department of Defense to conduct ship-to-ship, ground, and air-to-ground operations in the affected area
- The Commission granted STAs and temporary frequency authorizations to parties working to support relief efforts and to utilities working to restore phone and electric service in the affected area
- September 2nd, the Commission suspended its rules in order to permit noncommercial educational (NCE) radio and television stations in New Orleans to rebroadcast programming, including commercial matter, received from commercial broadcast stations
  - designed to bring immediate life saving and other important program information to the residents of New Orleans in the most expeditious manner possible
- September 2nd and September 4th, the Commission granted STAs to provide Internet connectivity to more than 200 shelters operated by the American Red Cross.

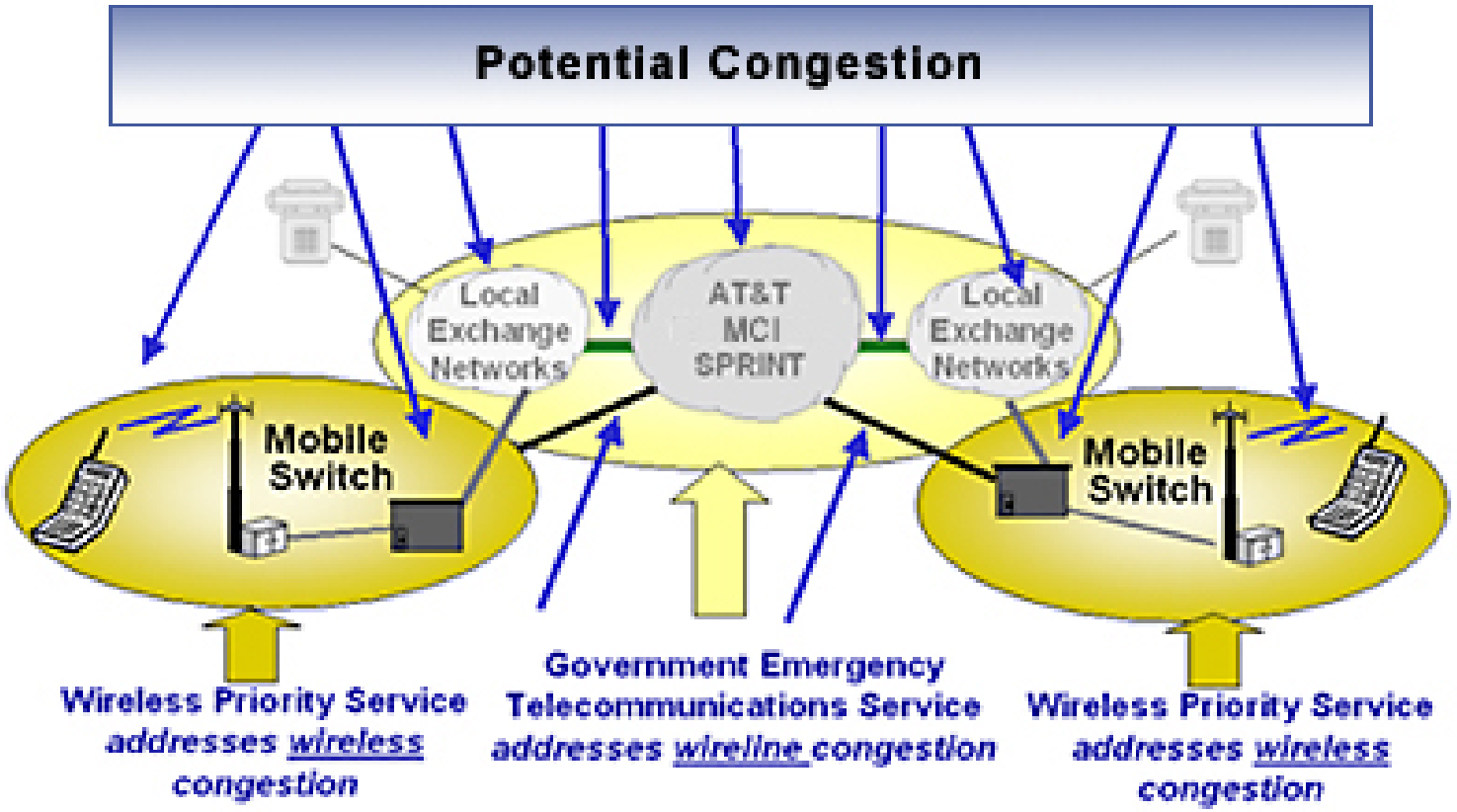
STA for Amateur Radio…

- On September 1st, the Commission issued informal guidance to amateur radio operators that they have authority to make transmissions necessary to meet essential communication needs and facilitate relief actions, and that prior Commission approval is not required for such transmissions

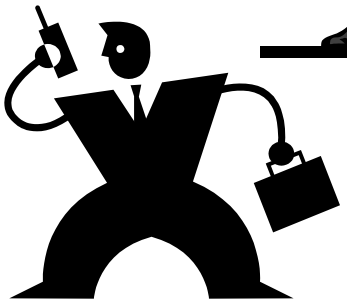
Wireless Priority Access

- Because of the unprecedented volume of calls made on the wireless network following 9/11, Cingular built (per federal direction) the capability to prioritize wireless calls following a disaster so that the most important calls coming from first responders were the first calls completed
- This functionality was put to its first real test after Hurricane Katrina and it worked well

Fundamental Issue is Congestion



WPS – Who get access first?



FCC Actions…

- DA 05-2427 (September 7, 2005) "FACILITATING RESTORATION OF WIRELESS FACILITIES IN AREAS IMPACTED BY HURRICANE KATRINA"
  - Assistance to wireless radio service licensees with communications facilities in Louisiana, Mississippi, and Alabama
  - Licensees may need to alter the operating parameters designated in their current license(s) (e.g., location, power, antenna height, frequency)
    - In some instances, will require frequency coordination
    - List of FCC-certified frequency coordinators for land mobile radio operations and coordinating bodies for microwave radio operations

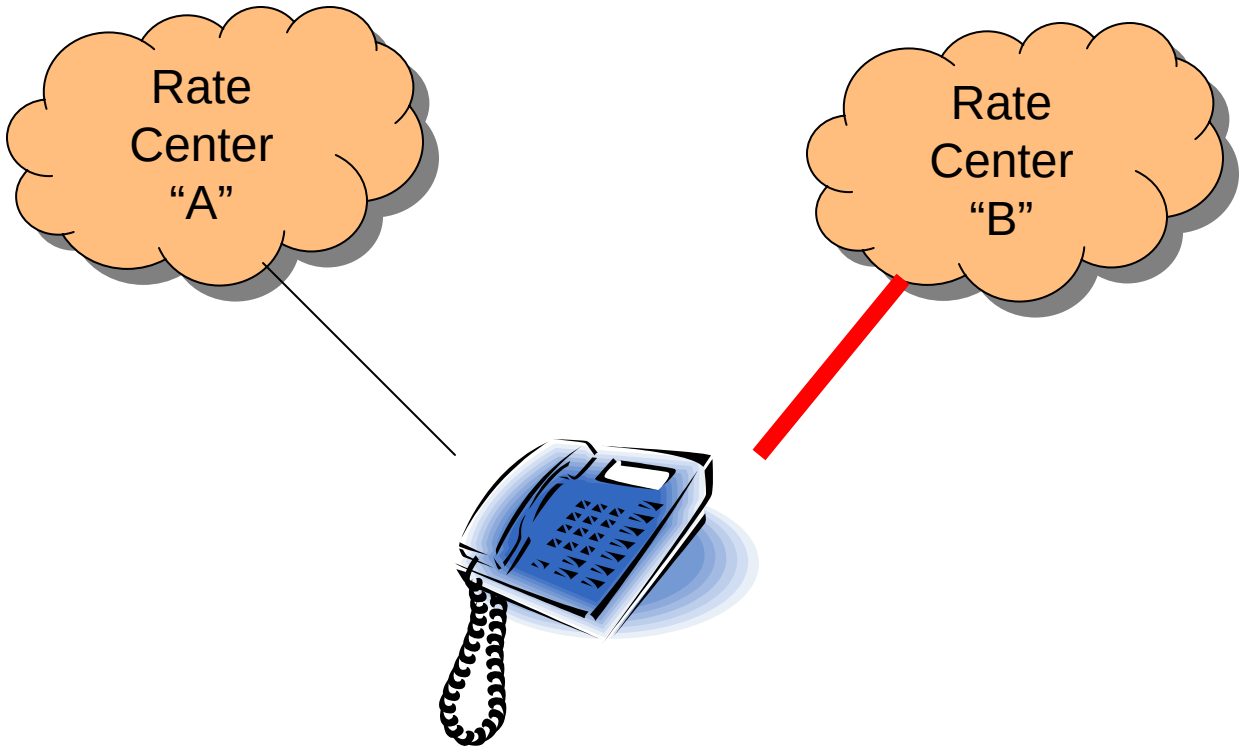
Telecommunications Service Priority Program

- Provides national security and emergency preparedness (NS/EP) users priority authorization of telecommunications services that are vital to coordinating and responding to crises
  - Telecommunications services are defined as the transmission, emission, or reception of intelligence of any nature, by wire, cable, satellite, fiber optics, laser, radio visual or other electronic, electric, electromagnetic, or acoustically coupled means, or any combination thereof
- As a result of hurricanes, floods, earthquakes, and other natural or man-made disasters, telecommunications service vendors may become overwhelmed with requests for new telecommunications services and requirements to restore existing telecommunications services
- The TSP Program provides service vendors with a Federal Communications Commission (FCC) mandate for prioritizing service requests by identifying those services critical to NS/EP

Porting Numbers Out of Area…

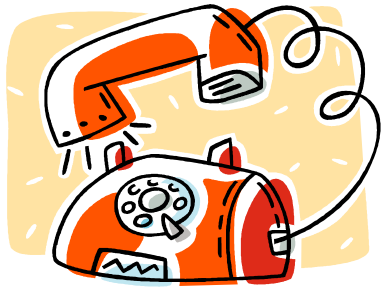
- FCC 05-161, September 1, 2005
- Local number portability (“LNP”)
  - Wireless LNP is a wireless consumer's ability to change service providers within the same local area and still keep the same phone number
  - Local number portability rules do not extend to location or service portability
- Granted a temporary waiver of the Commission’s numbering rules to allow carriers in Alabama, Mississippi, and Louisiana, and the numbering administrators that support them, to port telephone numbers geographically outside of rate centers during the period of service disruption
- Permitted carriers to port customers’ numbers to remote locations, on a temporary basis

Porting Numbers Out of Area…



Telephone Number Reassignment

- Numbering rules allows carriers to age numbers previously assigned to residential customers for no more than 90 days before making them available for assignment to another customer
- Customers that have been displaced by the hurricane may desire to discontinue their service temporarily and to reinstate it at a later time
  - customers may seek to reinstate their service after the 90-day period has lapsed
- Waiver of this rule will allow carriers to disconnect temporarily customers' telephone service, upon request, to avoid billing issues, and reinstate the same number when the service is reconnected for customers in the affected areas
  - is in effect until June 5, 2006



Change in Carrier…

- Carriers cannot change a customer's preferred carrier - must comply with the FCC carrier change authorization procedures
  - provide for the carrier-to-carrier transfer of customers such that the acquiring carrier need not obtain individual subscriber authorization and verification for the carrier changes
  - the acquiring carrier, no later than 30 days before the planned carrier change, must notify the Commission, in writing, of its intention to acquire the subscribers, and must certify that it will comply with the required procedures, including the provision of 30-day advance written notice to all affected subscribers
- DA-05-2415 enables carriers to temporarily become the providers of service to customers that are otherwise unable to obtain service due to Hurricane Katrina
  - waive the 30-day written advance notice requirement, for both Commission certification and customer notice, for the transfer of customers that are or were in the affected areas that no longer have service
  - Acquiring carriers should provide customers with notice of the transfer as soon as is practicable, including the rates, terms and conditions of the services provided


cingular
WIRELESS
8445
12:57PM


EXIT
DRIZAIR 80
27 12:59PM

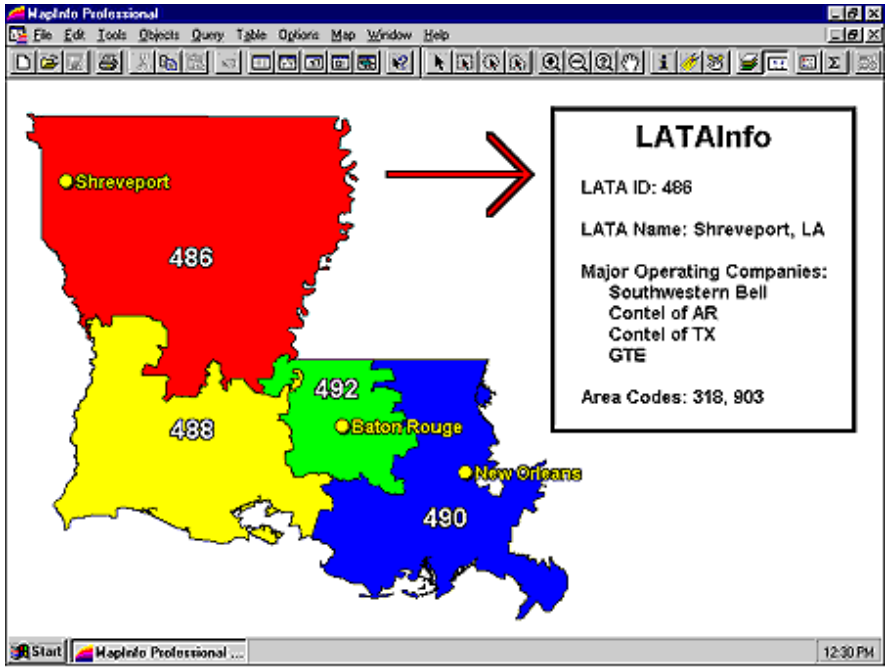

Lucent
Feature
Hold
27 1:00PM

How Do I Pay My Telecomm Bill?

- Fear of getting their wireless service shut off for inability to pay their bill …
  - Post Office not operating fully
  - Commercial power capability was not available throughout the affected area, and the
  - Communications networks (including access to the Internet for online bill pay options) were not available
- Common practice in the wireless industry was to continue providing service to displaced people who cannot pay their bills in the wake of Hurricane Katrina
- All licensees of wireless services serving consumers affected by the hurricane were required to submit a report no later than September 8, 2005 verifying their compliance with the standard industry practice of maintaining service to people displaced by Hurricane Katrina despite failure to pay bills

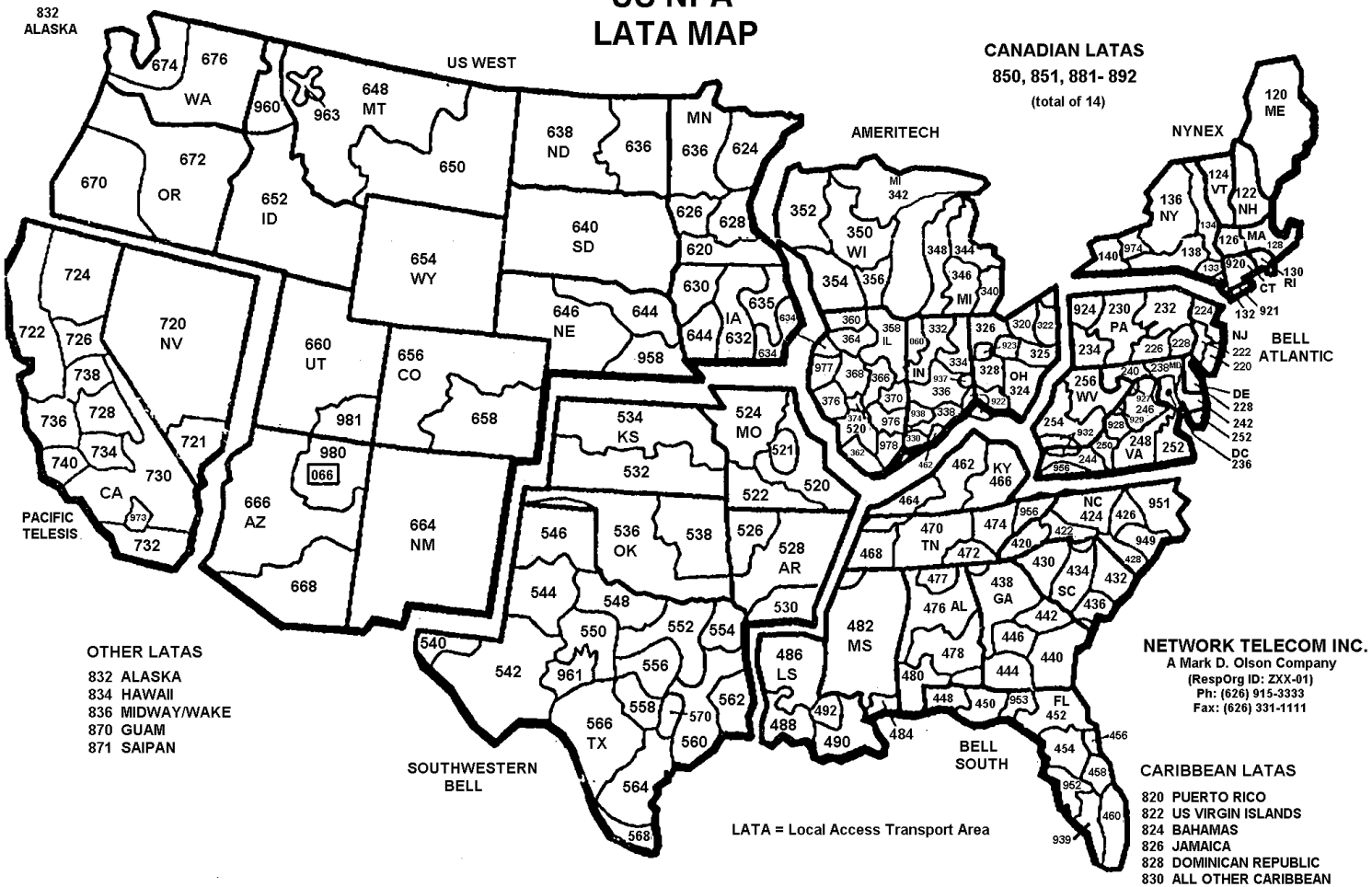
Inter-LATA Traffic Re-route

- BellSouth granted permission for routing of traffic across LATA boundaries that otherwise would be routed within LATA boundaries



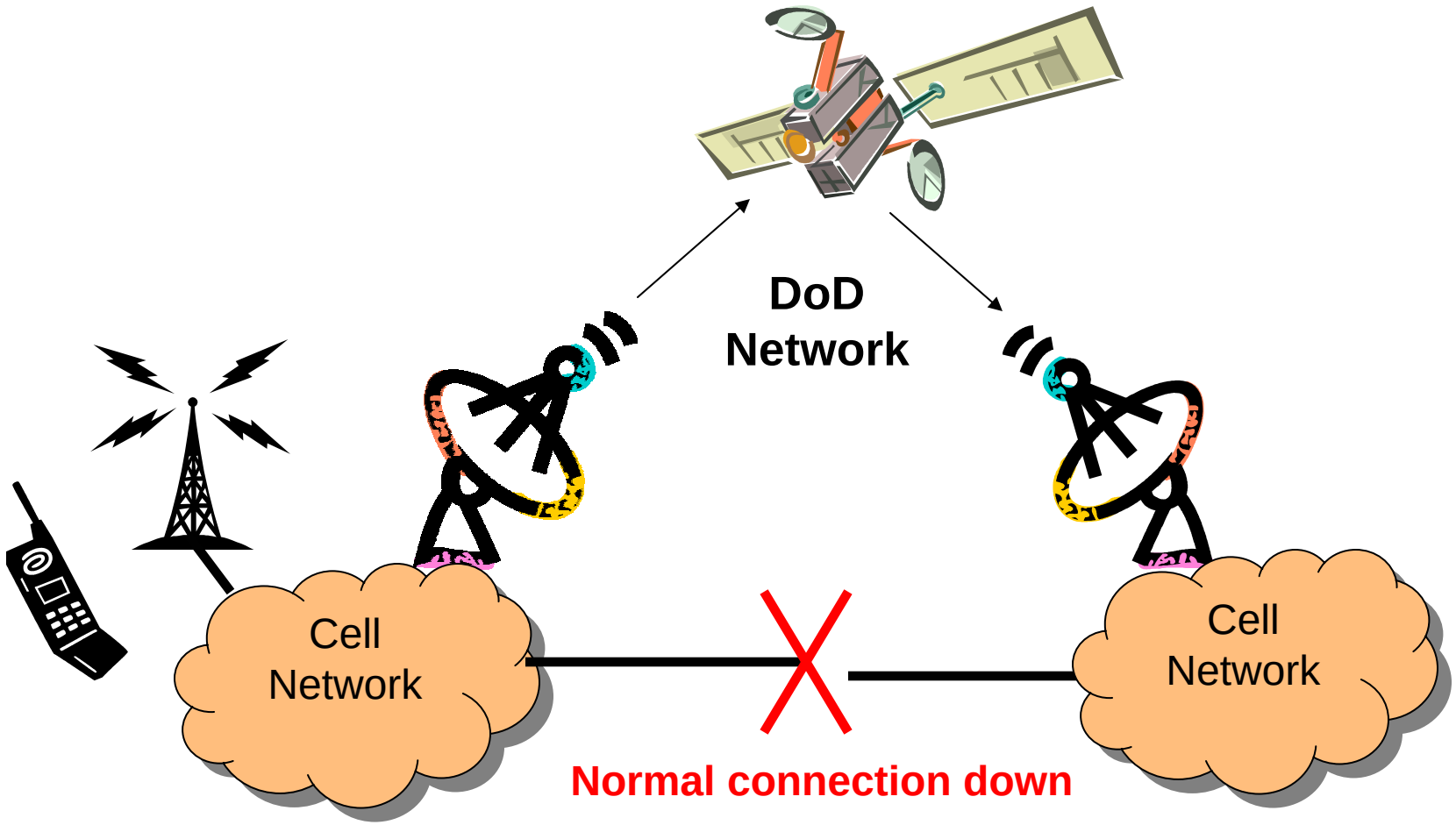
State of Louisiana, shaded by LATA regions

US NPA LATA MAP



NETWORK TELECOM INC.
A Mark D. Olson Company
(RespOrg ID: ZXX-01)
Ph: (626) 915-3333
Fax: (626) 331-1111

DOD Satellite Systems Support Cell Phones



FCC Programs

- Wireless handsets and a package of 300 free minutes for evacuees and people in the affected area without telephone service
- Allow public and non-profit health care providers, including American Red Cross shelters providing health care services to disaster victims, to apply for support for advanced services used for telemedicine applications to treat disaster victims

FCC Organizational change..

- Public Safety/Homeland Security Bureau
- Develop policies and rules to promote effective and reliable communications for public safety, national security, and disaster management, including:
  - Public Safety Communications, including 911 centers and first responders
  - Priority Emergency Communications
  - Alert and Warning of U.S. Citizens
  - Continuity of Government Operations
  - Disaster Management Coordination (i.e., infrastructure reporting and analysis in times of disaster)
  - Disaster Management Outreach
  - Communications Infrastructure Protection
  - Network Reliability and Interoperability
  - Network Security

Humanitarian Response..

- Cingular immediately moved to take care of employees so they could take care of customers
  - provided food, water, and basic supplies from trailers that was trucked into the affected areas
  - set up tent cities in Ocean Springs and Hammond that housed as many as 400 people
  - in less than two weeks, provided inoculations, banking services, and even day care from licensed providers at the call center in Ocean Springs
- Cingular not only provided food, shelter, and basic necessities for their own employees, but they also reached out to the police, local hospitals and the National Guard
  - provided fuel for police cars, generators for hospitals, and food and shelter for first responders


WELCOME
TO
Cingular
City


FASTENAL COMPANY


BELLSOUTH CITY

Safety Concerns

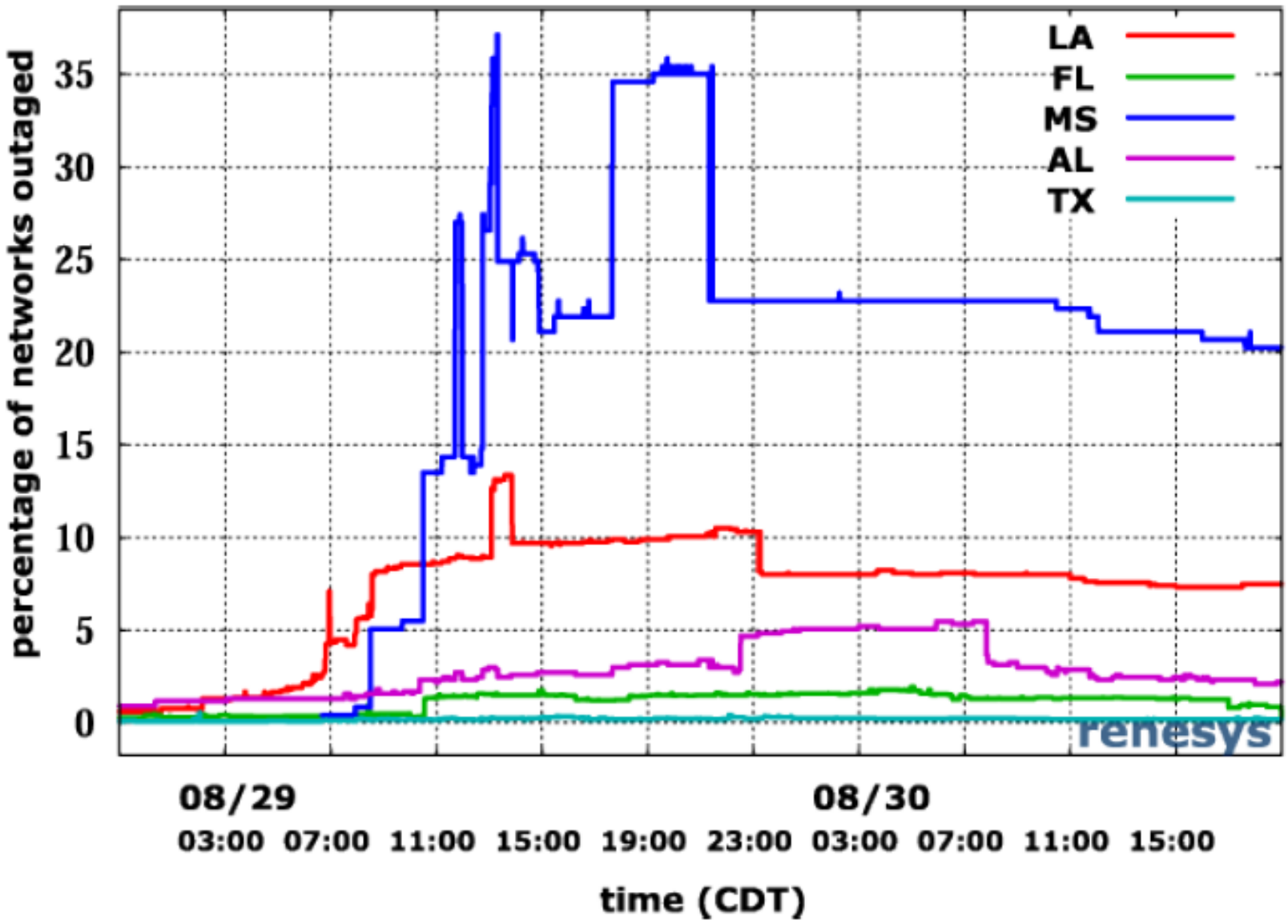
- Hampered telecom response efforts..
  - Physical safety
  - Health Issues
  - Environmental safety

VoIP

- NEW ORLEANS -- For days after Hurricane Katrina's devastating rampage through this city, a small corps of city leaders holed up at the Hyatt Hotel. They had virtually no way to communicate with the outside world.

  When emergency power finally returned to the Hyatt, Scott Domke, a member of the city's technology team, remembered that he had recently set up an Internet phone account with Vonage Holdings Corp. He was able to find a working socket in a conference room and linked his laptop to an Internet connection.

  At 12:27 a.m. on Wednesday, Aug. 31, the mayor's inner circle made its first outside call in two days. Eventually, the team was able to get eight lines running from the single Vonage account. That evening, the phone rang and it was President Bush calling from Air Force One.



http://www.renesys.com/tech/presentations/pdf/Renesys-Katrina-Report-9sep2005.pdf

Wireless Lessons Learned

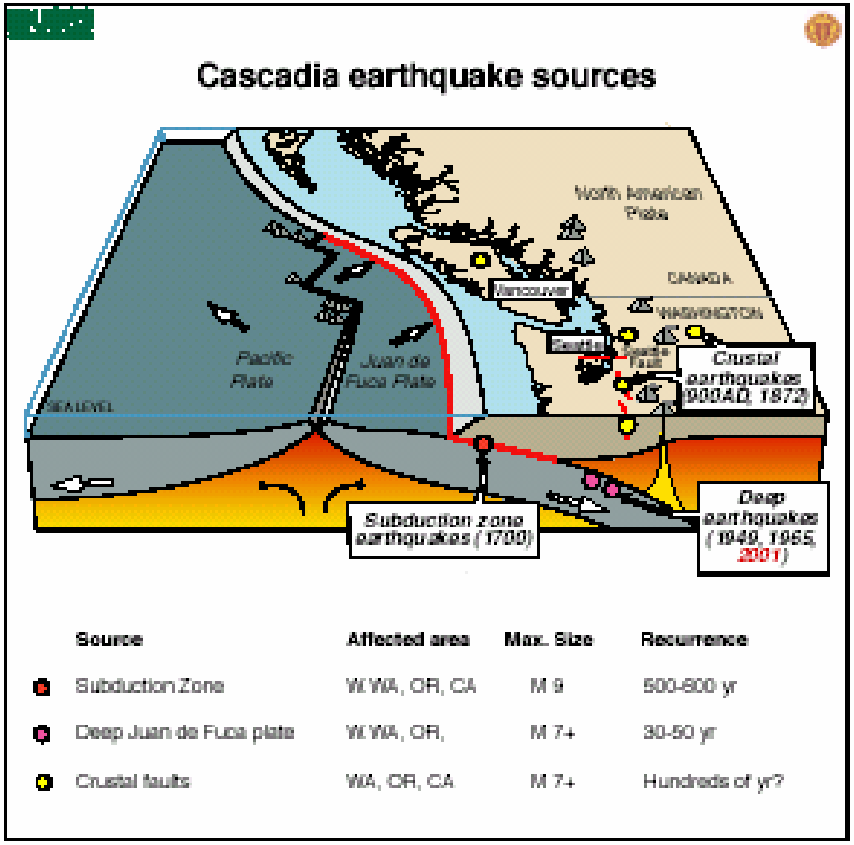
- Katrina has demonstrated that there is no thickness of steel or level of network redundancy that can guarantee any communications network will survive a worst-case natural or man-made disaster
- Two most important lessons learned from Katrina
  - the effectiveness of Wireless Priority Services (WPS)
  - need to develop a wireless solution for worst-case scenarios where the local network infrastructure has been destroyed

What about the Pacific Northwest?

- 1,660 dead
- 24,200 injured
- 9,700 buildings destroyed
- 29,000 buildings severely damages and unsafe
- 154,000 buildings moderately damaged with use restricted
- 130 fires burn
- All major highways experience partial closures lasting months
- Utilities cut in areas with poor soils
- Port facilities badly damaged
- Businesses disrupted due to collapsed supply houses, transportation closures, communication outages
- Property Damage $33B

Our “Katrina”??...

Scenario for a Magnitude 6.7 Earthquake on the Seattle Fault



In a major Pacific Northwest event, expect..

- Landline & wireless phone outages due to damaged equipment, loss of power
- For those networks that are working, expect severe congestion of the network
- Radio & TV outages??
- Sporadic internet connectivity
- Public safety communication problems

Where do we go from here?

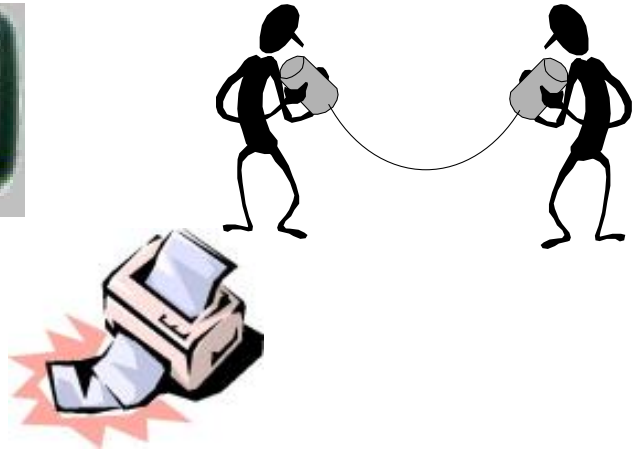
- We must ensure that the public has the tools necessary to be alerted when an emergency is coming and to contact first responders
  - Must include the Internet
- Enable first responders to communicate seamlessly during a disaster
  - New technologies such as "smart radios" and mobile antennas can be used to re-establish communication as quickly as possible
  - Equipment that can communicate on multiple frequencies and in multiple formats so police, firefighters and EMS personnel at the local, state and federal levels can all talk to one other
- Communications providers develop and adhere to best practices to ensure reliability and quick restoration of services in the event of a disaster.
  - Include maintaining service during extended commercial power outages using back-up generators and equipment
- Cingular is moving as expeditiously as possible to expand Pegasus so satellite COLTS can be built and made available in key locations around the U.S. for more-effective deployment

- “I would also like to see a greater use of IP technologies that are capable of changing and rerouting telecommunications traffic. In the event of a systems failure within the traditional network, such IP technologies would enable service to be restored more quickly and would provide the flexibility to initiate service at new locations chosen by consumers.”

Remarks of Chairman Kevin J. Martin
Second Meeting of the FCC’s Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks
Jackson, Mississippi
March 6, 2006

Communicating – Job #1

- Important to remember your job is:
  - ***"communicating"***
- Communicating does not automatically imply **amateur radios**
  - **Be prepared to use any means required**




WHEN ALL ELSE FAILS...
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AMATEUR RADIO
146.610


Thank You!!
Questions?