

# Migration to LTE - Infrastructure Impact

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# Bechtel Overview

- > 2007 Revenue
  - \$ 27.0 billion
- > Employees
  - More than 40,000 worldwide
- > Major Offices
  - 50 offices worldwide
- > Active Projects
  - 950 in 67 countries
- > Business Lines
  - Communications
  - Infrastructure  
(Civil, Rail, Water & Aviation)
  - Power
  - Oil, Gas and Chemicals
  - Government
  - Mining & Metals
  - Bechtel Enterprises

*Uninterrupted family leadership provides stability, continuity*



Stephen D. Bechtel, Jr. (1960-1990)

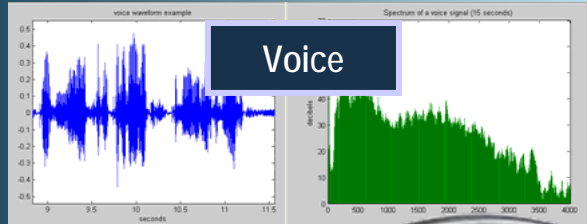
Stephen D. Bechtel, Sr. (1933-1960)

Warren A. Bechtel (1898-1933)

Riley P. Bechtel (1990-Present)

# Evolution of Communications

Natural Monopoly – Ma Bell



De-Regulation

Content

Devices

Applications

Networks

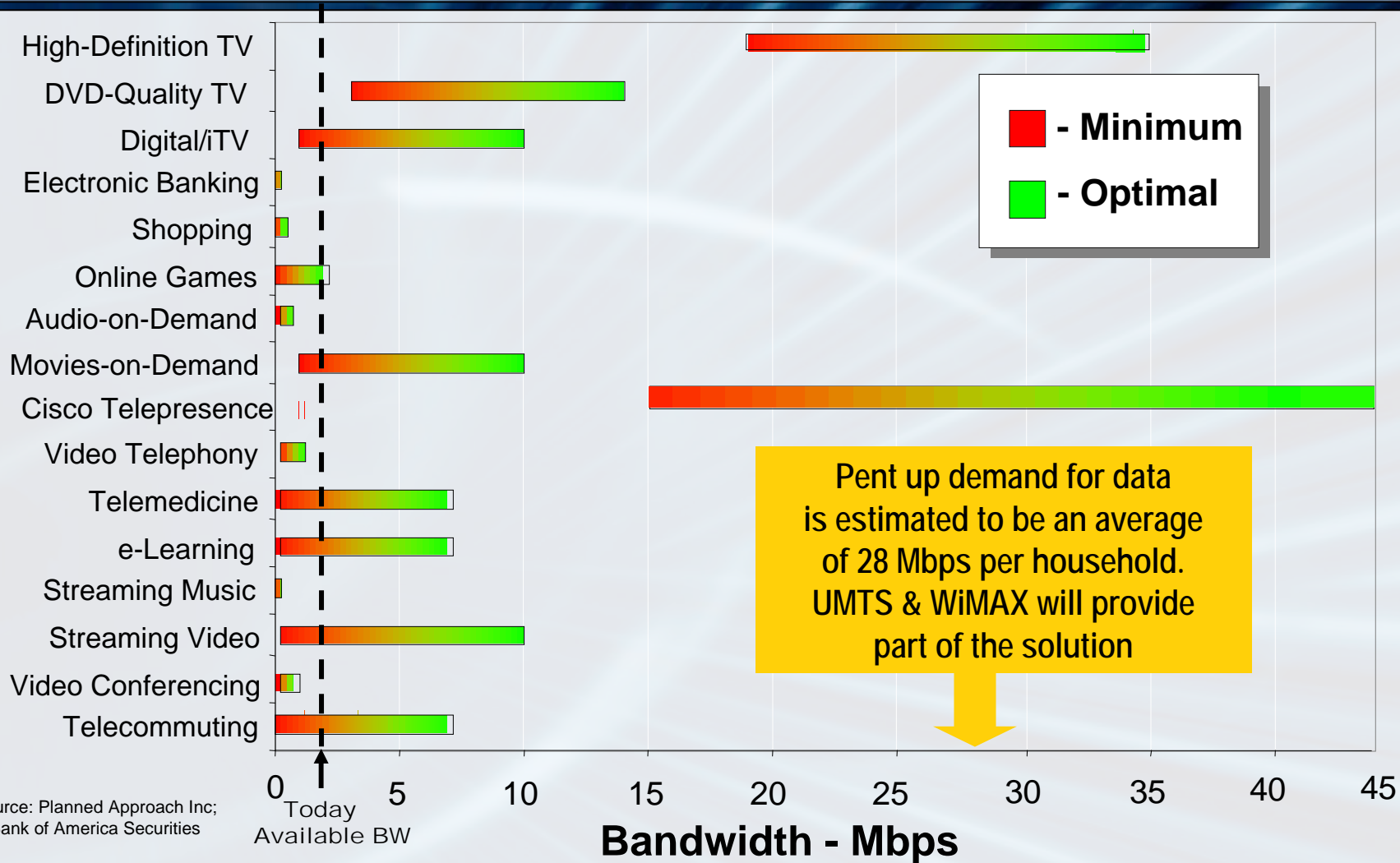
Dial Tone

CPE

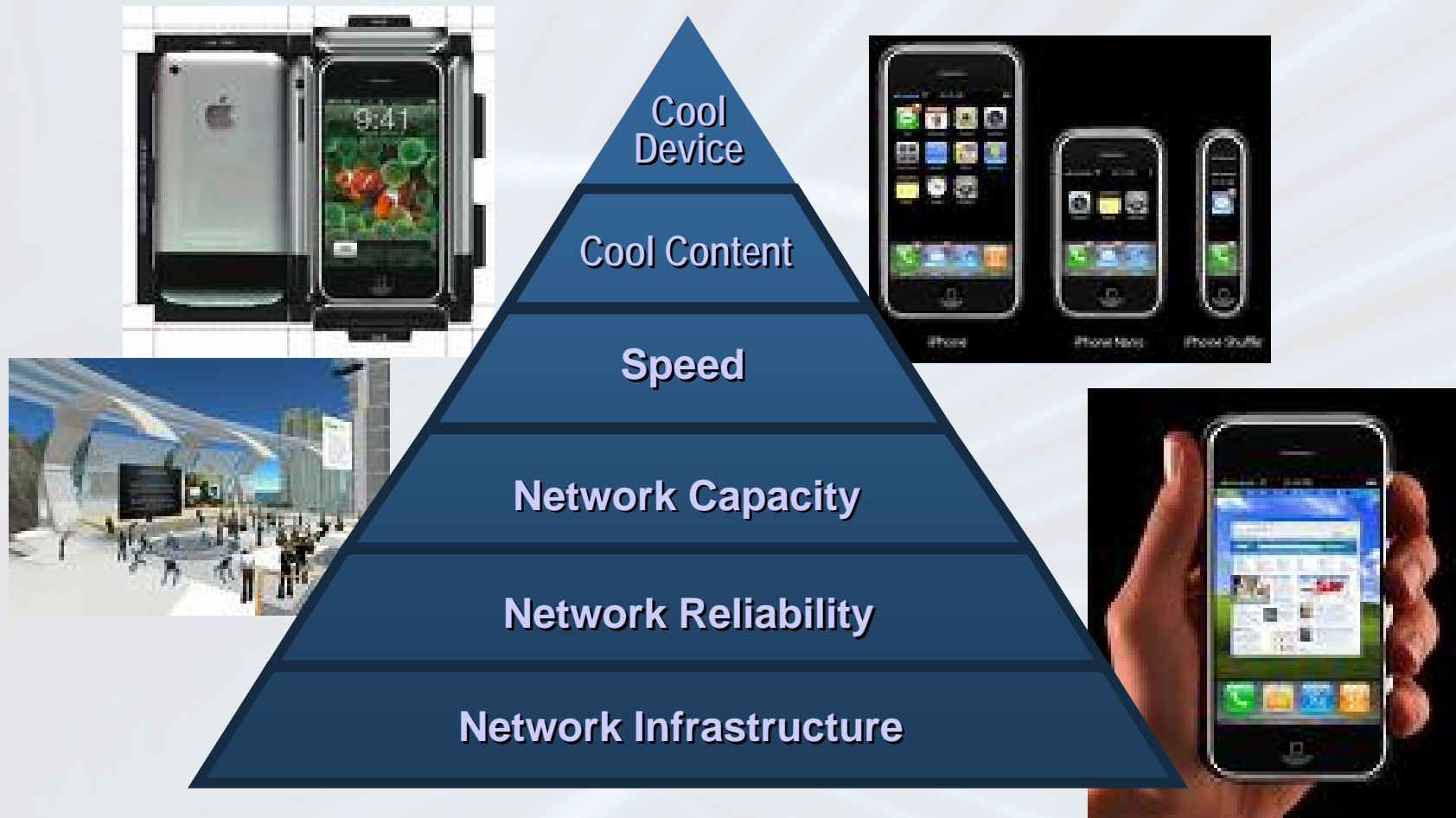
Network



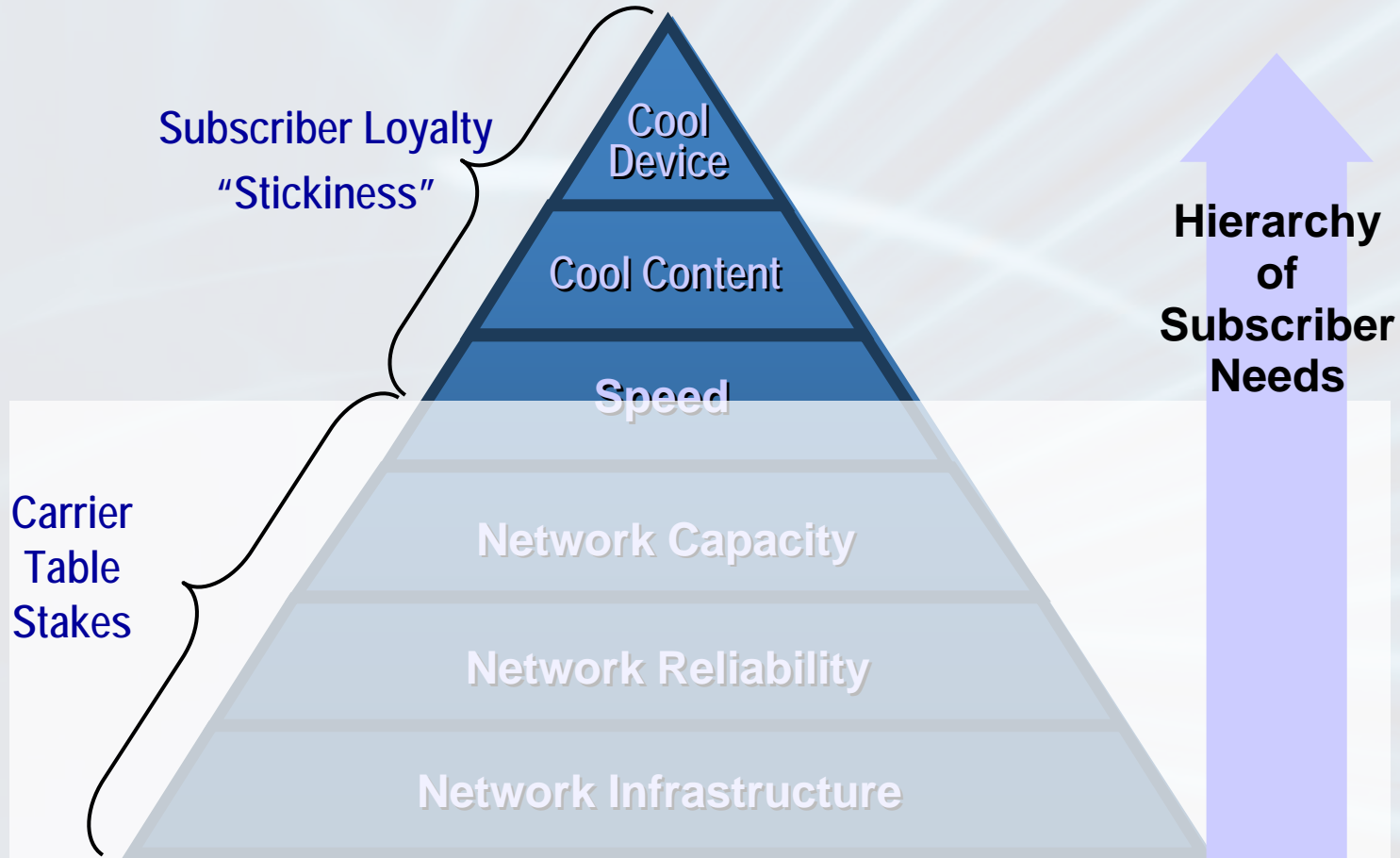
# Applications Drive Bandwidth



# Where is the Secret Sauce?



# Battle for the Subscriber

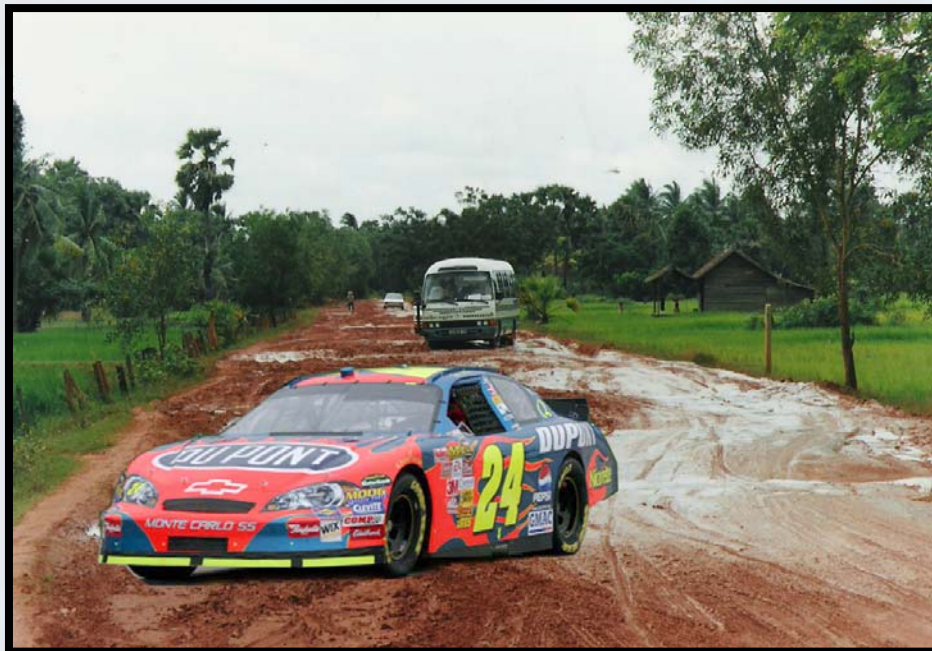


*Subscriber's Differentiate at the Top of the Pyramid*

# High Speed over the Air

High Speed data transmission is DEPENDENT on a stable air link (Antenna to device)

Trying to push high speed data over a limited air link is like trying to run a NASCAR down a dirt road.



## Long Term Evolution Technology Deployment Implications

1. Backhaul from the Access Network to the Core will be the prime area of focus. The high density applications will encounter blockage on the backhaul network. Only 10-16% of the cell sites have fiber connectivity.
2. The core network and transport networks nearing exhaustion.
3. Flat IP Architecture will reduce CapX and OpX and reduce the frequency of technology refresh cycles
4. The deployment of LTE will be a gradual overlay starting with dense urban areas and migrating out to the less dense regions. It will be a well planned gradual overlay.



# Bechtel Report

## Long Term Evolution Technology Deployment Implications (continued)

5. To minimize zoning and leasing issues, an antenna deployment strategy must be developed that considers existing leasing constraints as well as zoning and permitting restrictions.
6. Legacy technologies will remain in full commercial service for a period of 3 to 5 years. Ground space, tower space, power availability and HVAC will be issues on the overlay. Use of distributed RRU systems (e.g. Nokia Flexi or Huawei 3900 series) may be required.

# Bechtel Report

## Long Term Evolution Technology Deployment Implications (continued)

7. Fiber to the antennas will be deployed on roof top installations where maintenance on active elements can be conducted.
8. Structural assessments must be conducted on all collocated towers (guyed and self supporting) as well as roof tops to ensure structural integrity.

# Recent News (January 2009)

- > *"Analysts generally agree that mobile phones have become 'must-have' devices that most consumers will not part with, even in a dire economy."* [RCR](#)
- > *Wireless technology will continue to be a force-multiplier, not just in terms of enabling people and machines to talk with each other, but also with respect to advancing goals in education, health care, homeland security, and governing itself"* [Obama Campaign Playbook](#)
- > *"As bizarre as it might sound, the long term outlook for the wireless space couldn't be more promising."* [RCR](#)
- > *"Mobile devices will be the primary means of accessing the internet around the world in 2020."* [Pew Internet & American Life Project – survey of experts](#)

# Where are we Headed?

- Broadband Devices will proliferate.
- The BBN will become a commodity – a utility
- Akin to Electric Knives; Electric Lamps; Electric Razors, Drills, etc

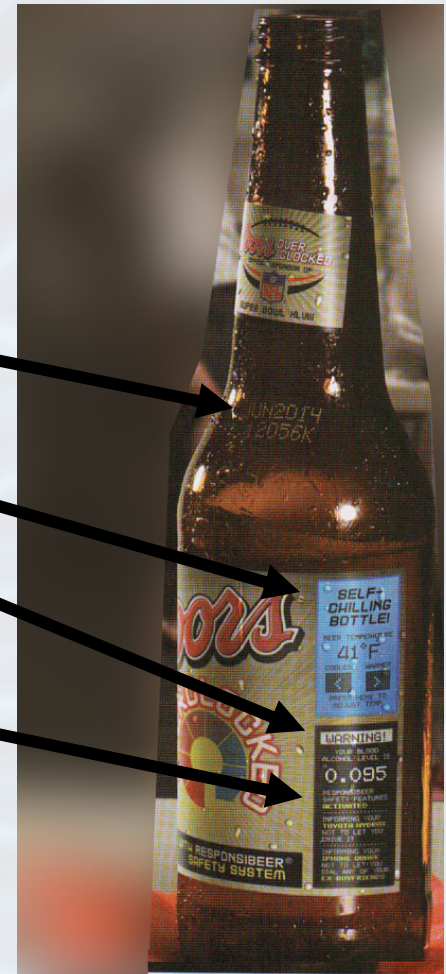


Source: Ambient Devices

# Where are We Headed?

## Coors Overclocked Brew with “Responsibeer Safety System”

- > Exp Date – “June 2014”
- > Self Chilling Bottle
- > Blood Alcohol Level Sensor
- > Responsible Safety Features “Activated”
  - “Notified your Toyota Hydra not to let you drive”
  - “Disabled your phone’s contact list of all ex-boyfriends”



Artifacts From the Future | BY SCOTT DADICH

# Summary

1. The consumer and business demand for bandwidth is steadily rising and will continue this trend for the foreseeable future
2. LTE and WiMAX will be the dominant technologies when they becomes commercially available (2009 - 2011)
3. LTE, WiMAX will require fundamental infrastructure changes
  - a) Backhaul
  - b) Antennas will be closer to street level
  - c) Core Transport
4. Communications is a fundamental human need

# Summary

- > Communications is a fundamental human need



Casablanca, Morocco

Source: New York Times International,  
Saturday April 21, 2007

# Thank You



**COMMUNICATIONS**

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*ATIS LTE Conference, January 2009*



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