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Wayne.Caswell@icm.siemens.com

A vision

Next Generation Phone Systems

Leveraging Digital Opportunities in Vertical Markets
(Parks Forum 2001, session V-B)

Four key trends converge

to benefit Homes, Offices (small, medium & large), Hotels, Coffee shops, etc.

- **Mobility**
  - Smaller, battery operated, portable devices
- **Personal phone #** (versus Location #)
  - Personalized colors, ring signals, menus, apps, etc.
- **Voice over Broadband** (DSL, cable…)
  - Carriers offer Integrated Service Bundles
  - Route calls through efficient Broadband networks
- **Multi-line, multi-handset Cordless**
  - Phone synchs with WLAN

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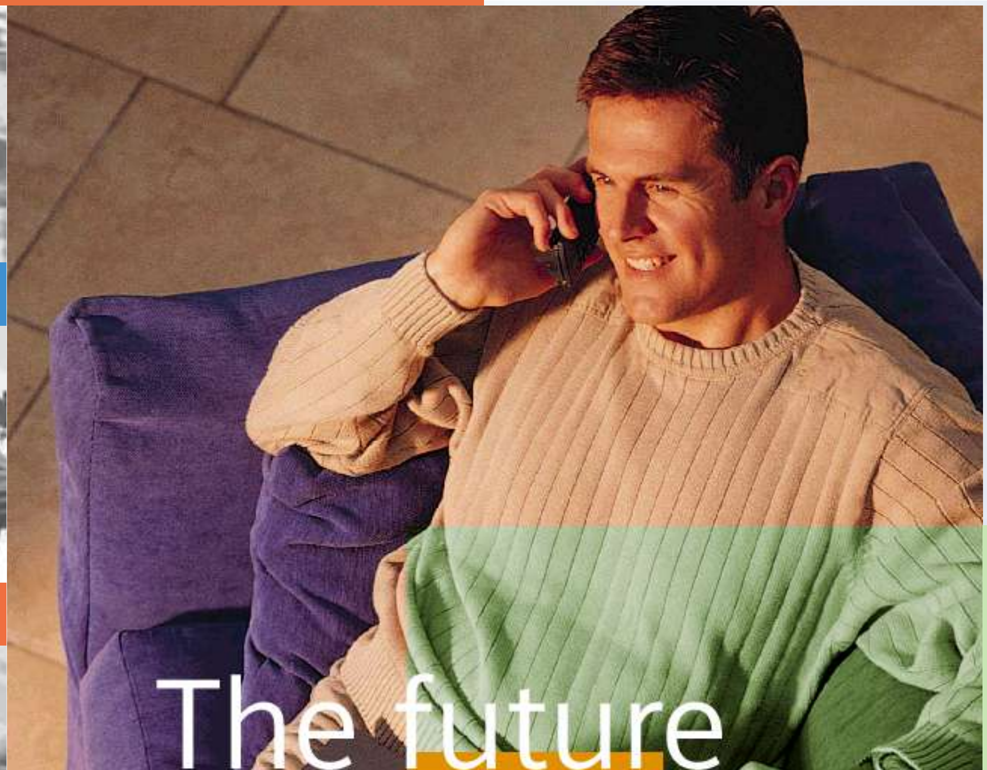

The future

is already here.

Mobility

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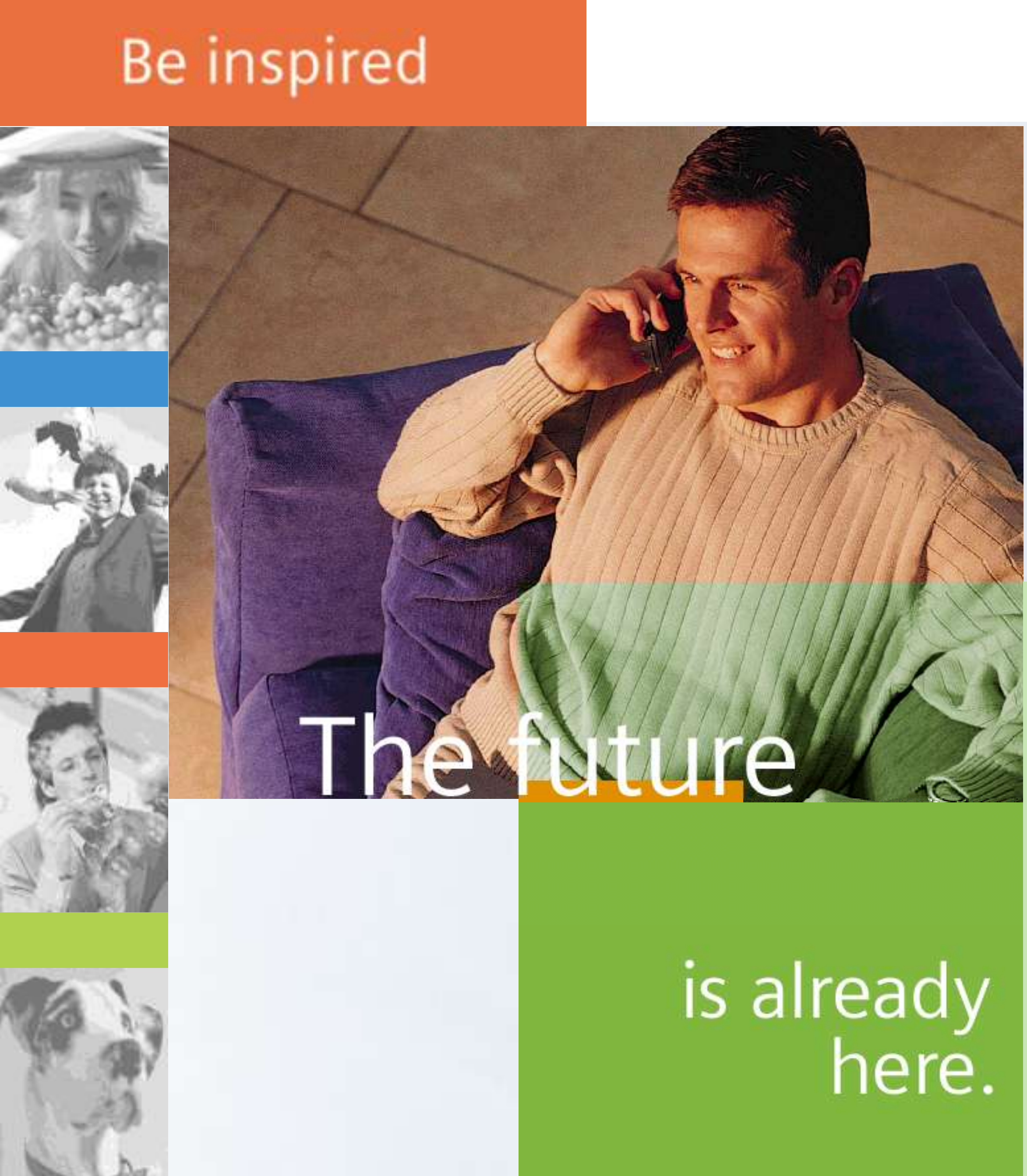
Mobility

As Moore's Law enables devices to become smaller and battery operated, they move around within the home and extend outside to:

- cars,
- hotels,
- airports,
- schools,
- coffee shops,
- business offices,
- shopping malls and retail stores,
- industry (mfg, warehouse, hospital, banking, etc.)

One Wireless Standard or Many?

- **For Every Location**: home, office, hotel, coffee shop, retailer, hospital, bank, etc.
- **For Every Device**: PC, tablet, PDA/HPC, phone, TV, stereo, car, consumer electronics
- **One Frequency?** 900 MHz, 2.4 GHz, 5 GHz, or licensed
- **One Protocol?** FHSS, DSSS, OFDM, ultra-wideband, proprietary
- **Interoperability**: multiple solutions
  - Multiple network interfaces (in Access Point or in Device)
  - Network interfaces that Adapt (Mobilian, Embedded Wireless Devices)
- **Choose the Best Fit**. Adapt if necessary.



Personal Phone

Leveraging Digital Opportunities in Vertical Markets
(Parks Forum 2001, session V-B)

The Personal Phone Number

Households have already started to replace local phone service with wireless.

- Ring Signals
- Menus
- Applications
- Colors

Auto Industry Leads the Way

- Manufacturers integrate technology into a Total solution so consumers don't have to select and integrate it themselves
- Technologies chosen by the company that does the integration become Standards faster than if they were chosen by individual consumers
- Consumers don't care about technologies or standards but want products that work and don't quickly become obsolete

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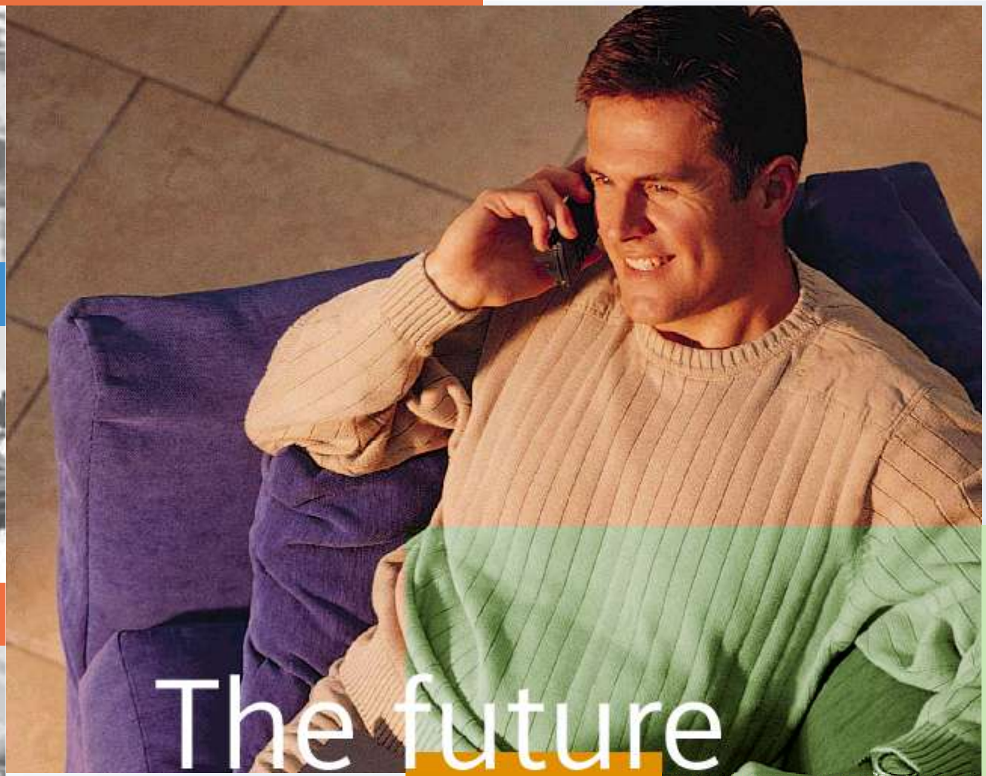

is already here.

Broadband Voice

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Broadband in Home & Vertical Markets

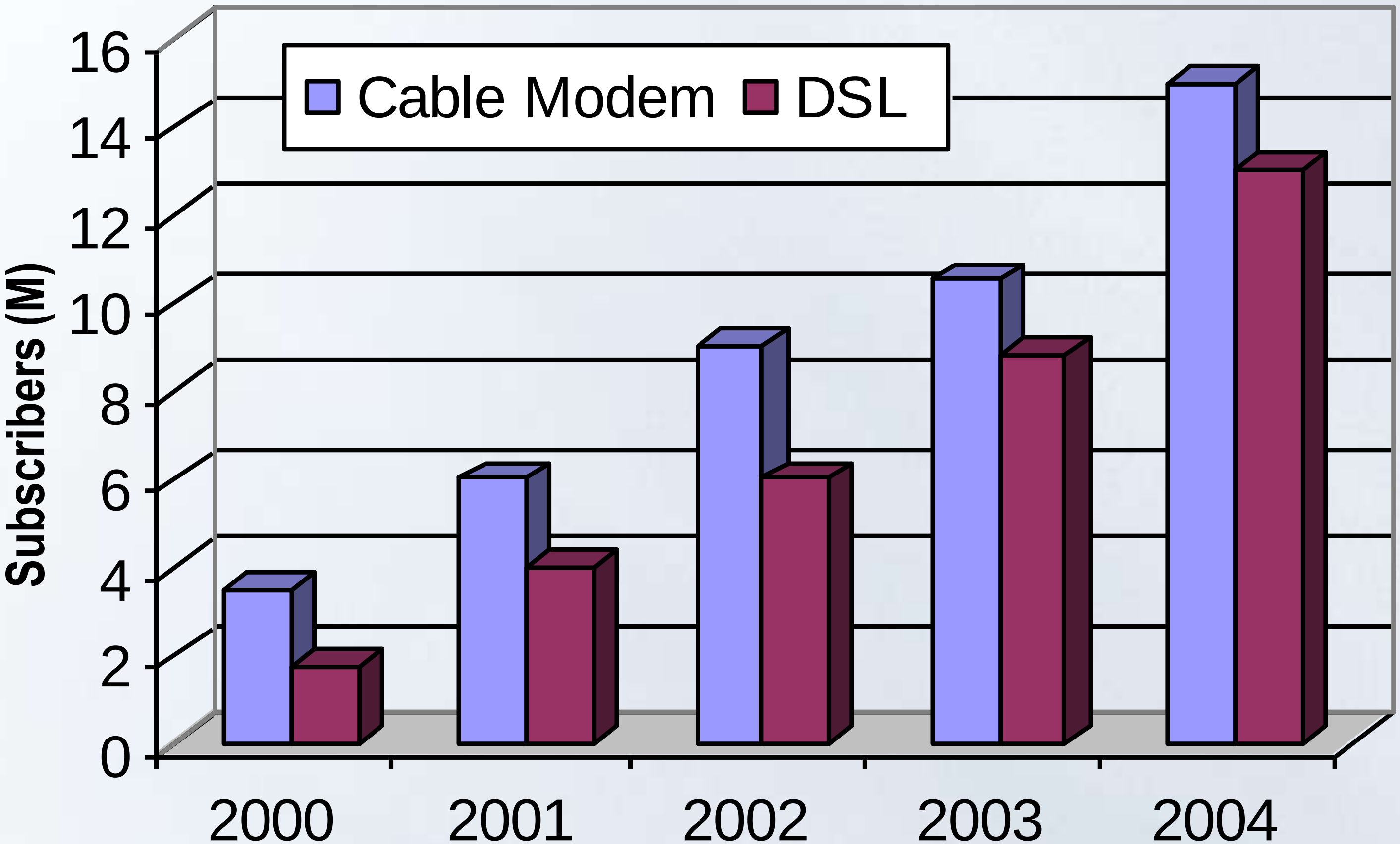
will happen even without consumers demanding it.

- **Carriers** – Integrated Bundles offer:
  - improved operational efficiencies (digital capacity vs. analog),
  - improved customer loyalty,
  - revenue protection (e.g. long distance),
  - new revenue sources (more phone lines), and
  - competitive barriers (limit switching incentives).

  Individual services become commodities. Carriers bundle or perish.

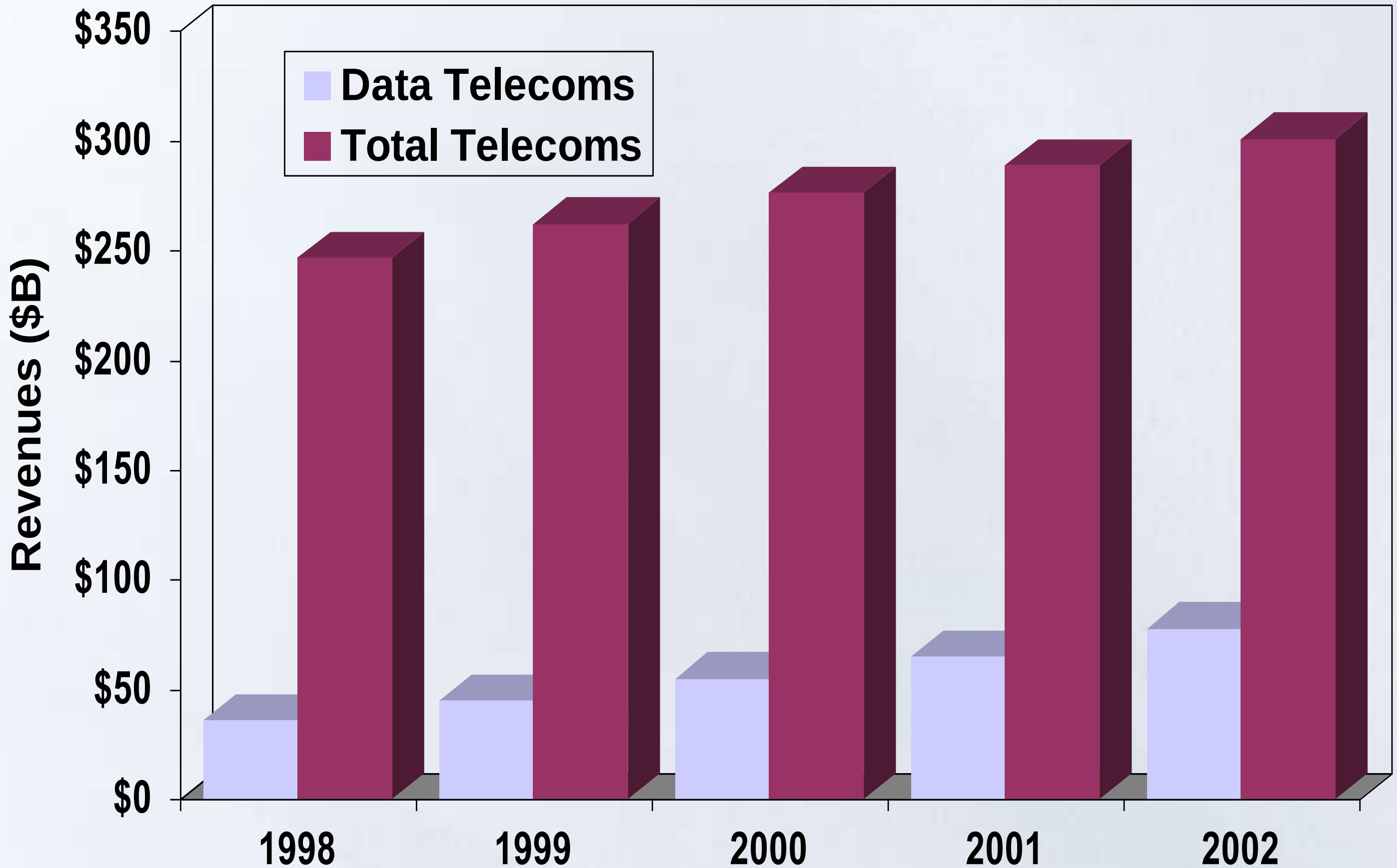
- **Consumers** – Integrated Bundles offer:
  - lower monthly costs,
  - new sources of value,
  - new functions for existing devices, and
  - the simplicity of a single bill and support #.

Broadband Market Growth



Source: FCC Composite of Various Analyst Forecasts (Merrill Lynch, Morgan Stanley, Bear Stearns, Bernstein/McKinsey, Dain Raucher, Veronis Shuler, Strategis, Lehman, Pioneer, DLJ)

DSL: Data revenues are Rising … but Voice revenues DOMINATE!



Source: IDC

BACKUP

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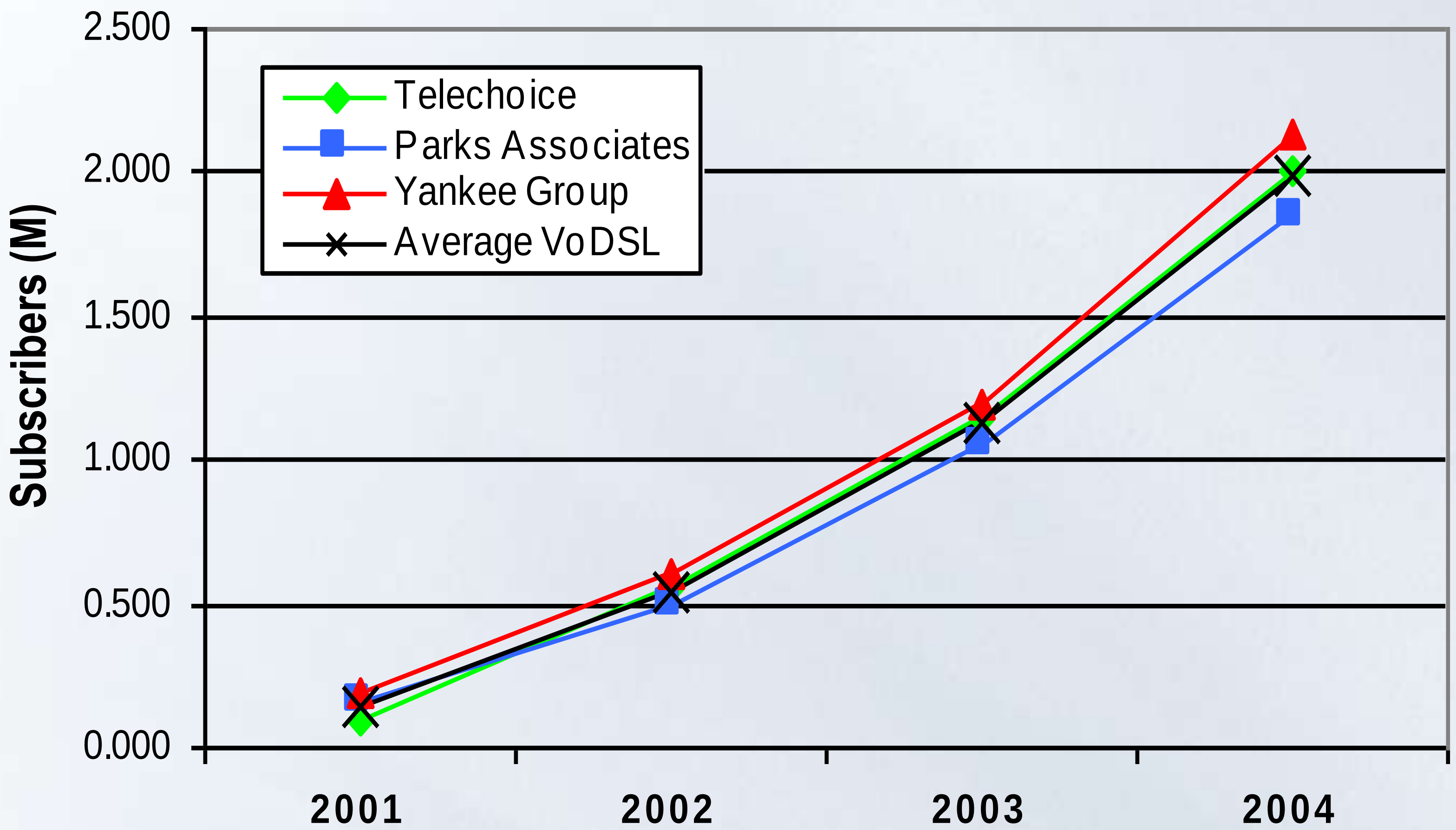
DSL Telephony - Market Oppy.



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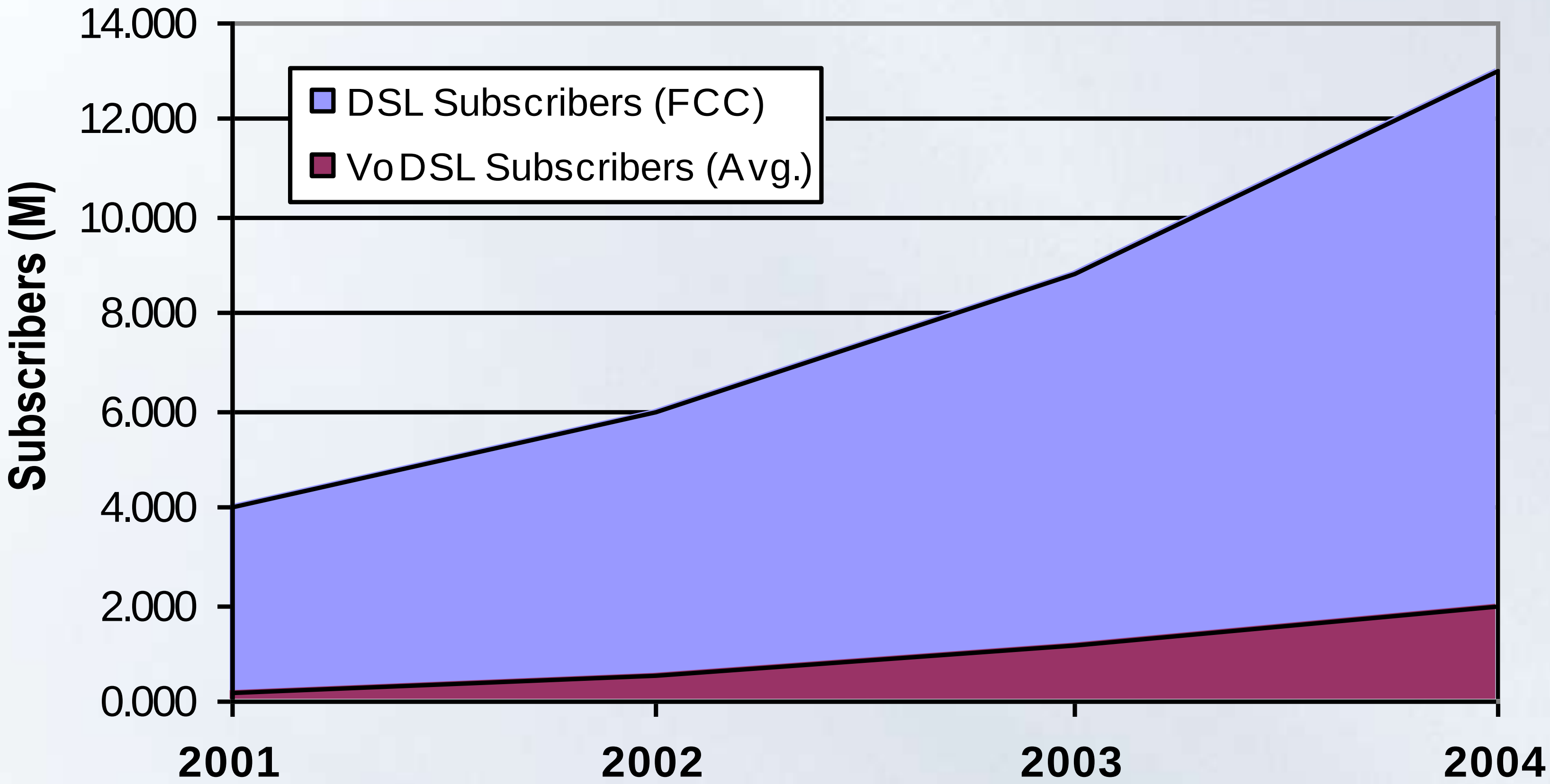
DSL Telephony vs. DSL Modems



Source: DSL average (FCC Composite), VoDSL average (Parks, Telechoice, Infonetics)

Leveraging Digital Opportunities in Vertical Markets
(Parks Forum 2001, session V-B)

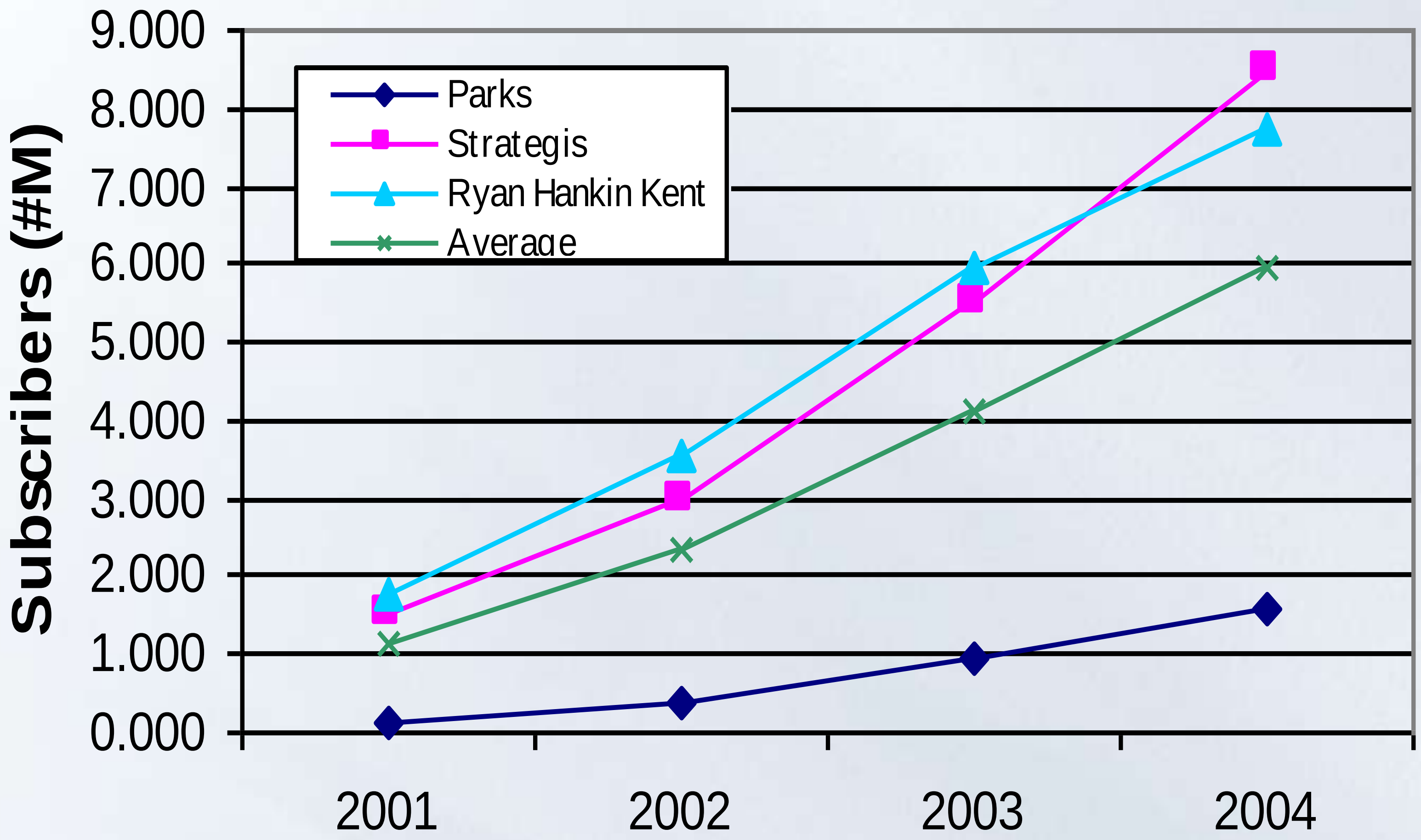
BACKUP

DSL Telephony - Market Drivers

- Driven by growth in Narrowband Market
  - Requirement to add 2nd line for dial-up access
- Driven by SOHO - most cost effective for 2 -16 lines
- Local Loop Enhancements
  - Need for intelligence - activate, monitor, measure, etc.
  - Automation to turn new services on/off
- Continued Deregulation of Access
  - Competitive access requires multiple operators
- Increasing Maturity of Broadband Technology

BACKUP

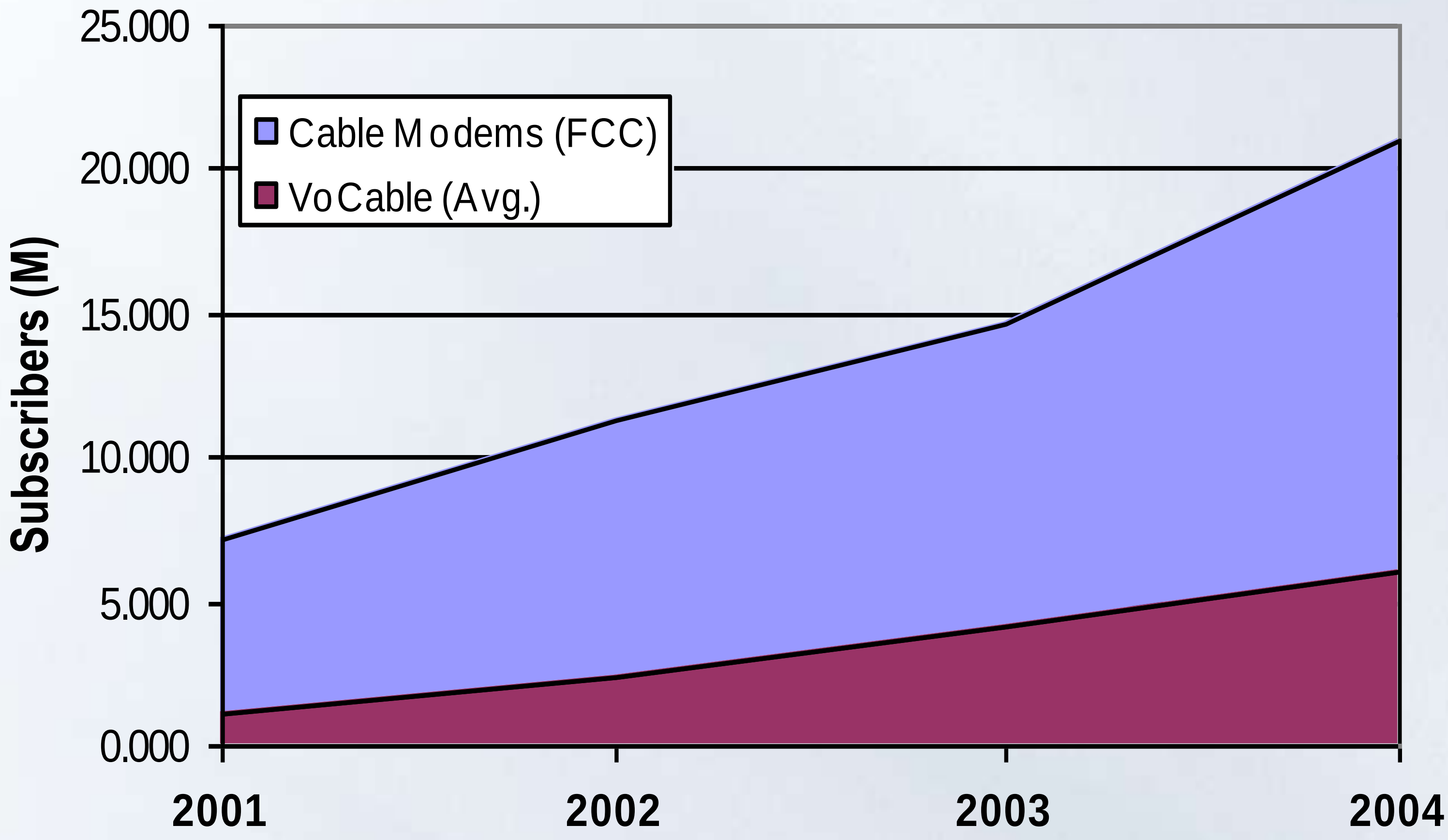
Cable Telephony Market



Sources: Strategis, Parks Associates 2000, and RHK

BACKUP

Cable Telephony vs. Cable Modems



Source: Cable Modem average (FCC Composite),
VoCable average (Parks, Strategis, and RHK)

Cable TV Dilemma

- 66.5M US Subscribers in 2000, 68 M in 2005
  - (up just 2.5%, Yankee Group)
- Cable's battle is on several fronts:
  - Digital Satellite promises More Channels & Clearer Picture
  - DSL will pass Cable Modem in 2003 with 11.3M lines, up from 2.3M in 2000 (Business Week, 12/4/2000)
  - DSL will offer bundled services with Video-on-Demand
  - Wireless Cable (MMDS, LMDS) has Cheap Infrastructure
  - Terrestrial DTV is Free with Great Quality & Growing Selection
  - Video Stores get Hollywood releases first
  - Personal Video Recorders (TiVo, ReplayTV)
- Less Advertising; Pending Writers & Actors Strike

Cable TV Actions

- Network Upgrades to Digital & 2-Way (Expensive)
  - $100 Billion – AT&T to bypass local loop; will open cable service to ISPs (not just @Home)
  - $120 Billion – AOL / Time Warner Deal is Approved
- Cable Modems – 2.9 M in 2000, 7.3 M in 2003
  - DOCSIS will bring Cable Modems to Retail
- Video-on-Demand – a Couch Potato's dream
- Voice-over-Cable – Local & Long Distance Revenue

BACKUP

Cable Telephony - Market Drivers

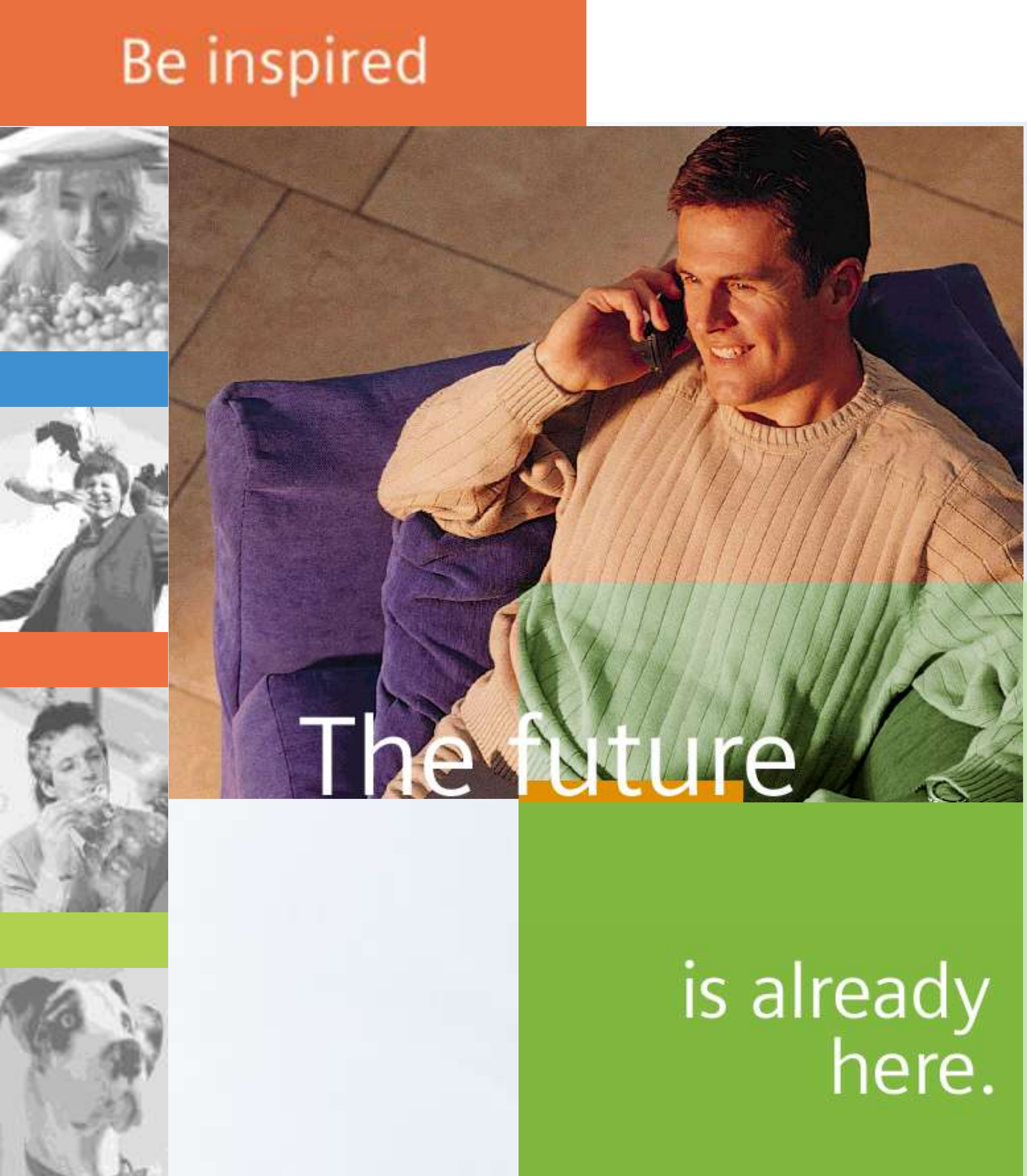
- Significant opportunities to grow revenue
  - Voice revenues dominate data revenues
- Consumers preferred bundles
  - Cable TV, Internet, Local & Long Distance Phone service, Mobile phone, Pager
  - Improved Customer Loyalty, Lower Total Cost, Single Bill
- Broad adaptation of DOCSIS 1.1
  - Cable Telephony standard for cable modems
  - Prioritized voice over IP
- Much improved security
  - No consumer fear of voice tapping
- Cable telephony QoS improvements
  - Latency, echo, jitter, lost packet & billing improvements
  - Lifeline service available

BACKUP

Cable Telephony Deployments

AT&T BSI	San Francisco, Chicago, Dallas, Denver, Hartford, Pittsburgh, Salt Lake City, Seattle, Los Angeles, Detroit, Atlanta, Jacksonville, Pompano, Boston, Richmond
Cablevision	Long Island NY & Fairfield County CT
Charter	N/A
Comcast	Alexandria & Prince William Counties VA and Price George County MD
Cox	Orange County CA, San Diego, Phoenix, Oklahoma City, Hampton Roads VA, Omaha, Hartford
Insight	Indiana
Time Warner	Rochester NY, Portland ME

Source: Pulver.com



Multi-line Cordless

Voice-Data Home Network

HomeRF NICs
Symphony N/W App
Voice-Data Module
Proxim

HomeRF Handsets
Siemens

HomeRF™

Telephony-Enabled
Cable / DSL Modems
(OEM)

HomeRF
Ethernet
Phoneline
Powerline
RJ-11
USB

VDM

Sample Gateway

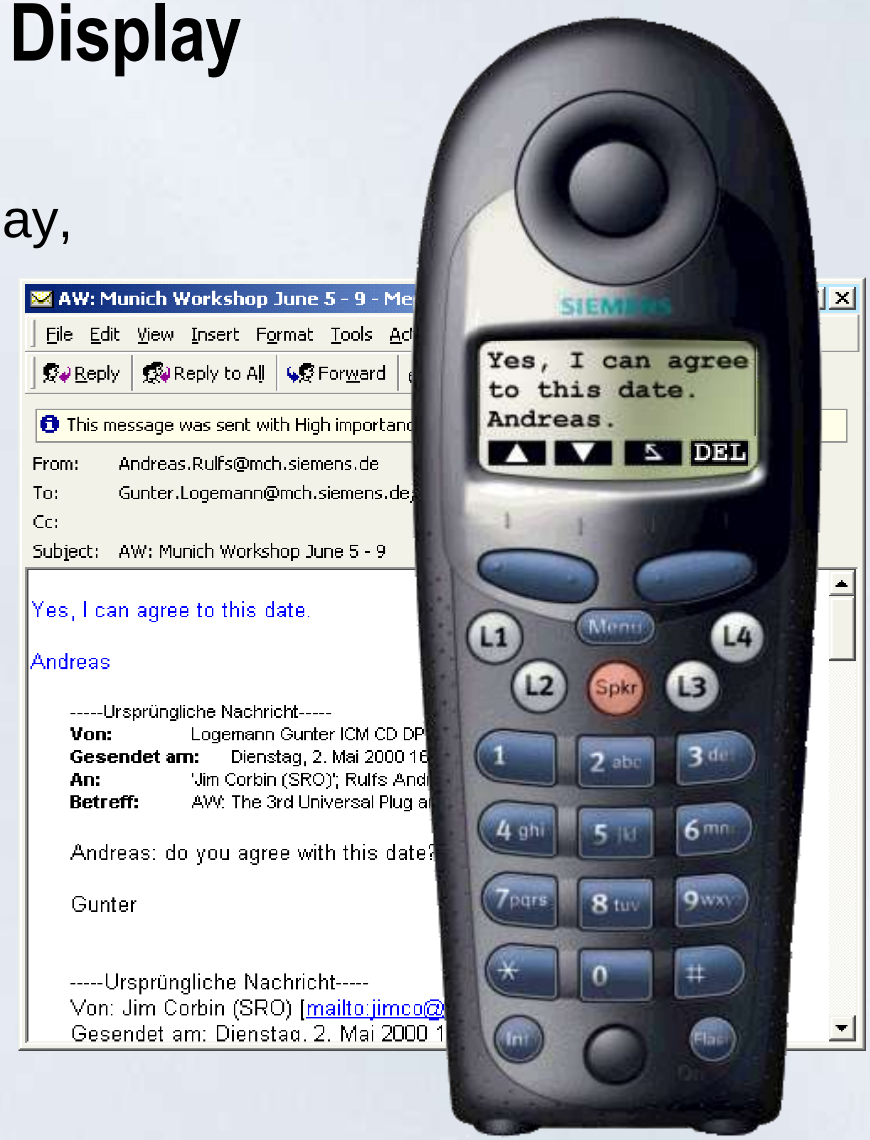
CTI Application
S/W Platform
Siemens

DECT & HomeRF Synergy

- Digital Enhanced Cordless Telephone (DECT) is the world's most successful cordless standard.
  - > 50M radios in 2000 alone (> 10X WLAN)
  - > 200M DECT handsets in the field by 2003
  - > 100 certified DECT suppliers, plus proprietary 2.4 GHz
  - 5th generation silicon with complete chipsets << $10
- HomeRF voice is directly derived from DECT voice.
  The PHY layer is implemented using components developed originally for DECT.
- HomeRF is the logical "Global DECT." It moves DECT forward to worldwide application with data and streaming media support at 10 Mb/s and beyond.

PC Services on Handset Display

- PC controls the handset display, receives all key presses.
- First Step:
  - Text menus
  - Text display
- Next Steps:
  - Scripting Extensions
  - UPnP Proxy
  - SDK
  - Speech recognition
  - Text-to-Speech



Be inspired

Telephony Unplugged: Next Generation Home Phone Systems
(www.hometoys.com/htinews/aug01/articles/caswell/caswell.htm)

Thank You

Leveraging Digital Opportunities in Vertical Markets
(Parks Forum 2001, session V-B)

Session Description

Leveraging Digital Opportunities in Vertical Markets

Description: While mass-market consumer interest in broadband applications remains tentative, companies are now fully exploring the market opportunities unique to vertical markets. This panel will examine this growing trend with the decision makers of the companies offering products and applications specific to vertical market segments.

Session Objective: The objective for this session is to discuss the vertical market opportunities for technology beyond the home market. Most companies do not have the resources to hit all potential market segments, but in a harsh environment, survival is key. Therefore, a shift in strategic focus may reveal key market segments that are willing to spend for or adopt new technologies.

Any applications for your technology for industry segments like automotive, energy, small business or any others are welcome for discussion. In essence we are leveraging the technology for vertical opportunities.