



The Industry Today

Products & Manufacturers
(Silicon Vendors & Equipment OEMs)



Silicon Vendors

Broadcom Corporation

- ◆ Home networking powerhouse through Epigram acquisition in April 1999
 - Founding member of Home Phoneline Networking Alliance
 - Provides silicon for access termination, home networking pieces of the puzzle and consumer devices
 - Technology is being licensed by Lucent and other giants
- ◆ Supplies BCM4210/BCM4100 "iLine 10" chipsets
 - Complete host bus to phone wire solution for home networking
 - Each code a packet of data so that the receiver can properly decode it

Broadcom Corporation

- ◆ BCM4210 MAC/PHY features
 - 10Mbps Ethernet controller for phoneline networks
 - Meets HPNA 2.0 proposed spec requirements
 - 16Mbps peak data rates
 - Integrated CSMA/CD Ethernet MAC with multi-level QoS
 - Integrated iLine10 digital PHY
- ◆ BCM4100 Integrated Analog Front End (IAFE) features
 - Custom IAFE for iLine10 controllers
 - Performs all required Analog Front End transmit & receive operations (PMD Function)
 - Transmit & receive filters
 - Analog to digital & digital to analog converters

Broadcom Corporation

- ◆ BCM3300 single chip cable modem features
 - Supports up to 4 lines of voice
 - Can be paired with iLine 10 chipsets for a full RG silicon solution
 - Can be paired with iLine 10 chipsets & set-top box chipsets for customers like General Instruments/Motorola & Scientific Atlanta for a RG solution

Conexant Systems

- ◆ Provides chipsets to enable broadband access and home phoneline networking
- ◆ ADSL modem
 - Uses DMT technology licensed from PairGain
 - Flexible & programmable ADSL transceiver
 - DSP based hardware
 - Supports G.Lite & full-rate ADSL

Conexant Systems

- ◆ V.90/K56flex modem
 - 33.6Kbps, 31.2Kbps, V.34, V.32 support
 - V.42 LAPM, MNP 2-4 & MNP 10 error correction
 - V.42bis & MNP5 data compression
 - Fax modem send & receive rates up to 14.4Kbps
 - Data/fax/voice call discrimination
- ◆ Home phone line networking
 - 1Mbps data rates, scalable to higher speeds
 - Ethernet: standard 802.3 MAC, CSMA/CD
 - Uses existing phonelines - no new wires required
 - Supports up to 25 nodes across 500 feet
 - Compatible with existing services

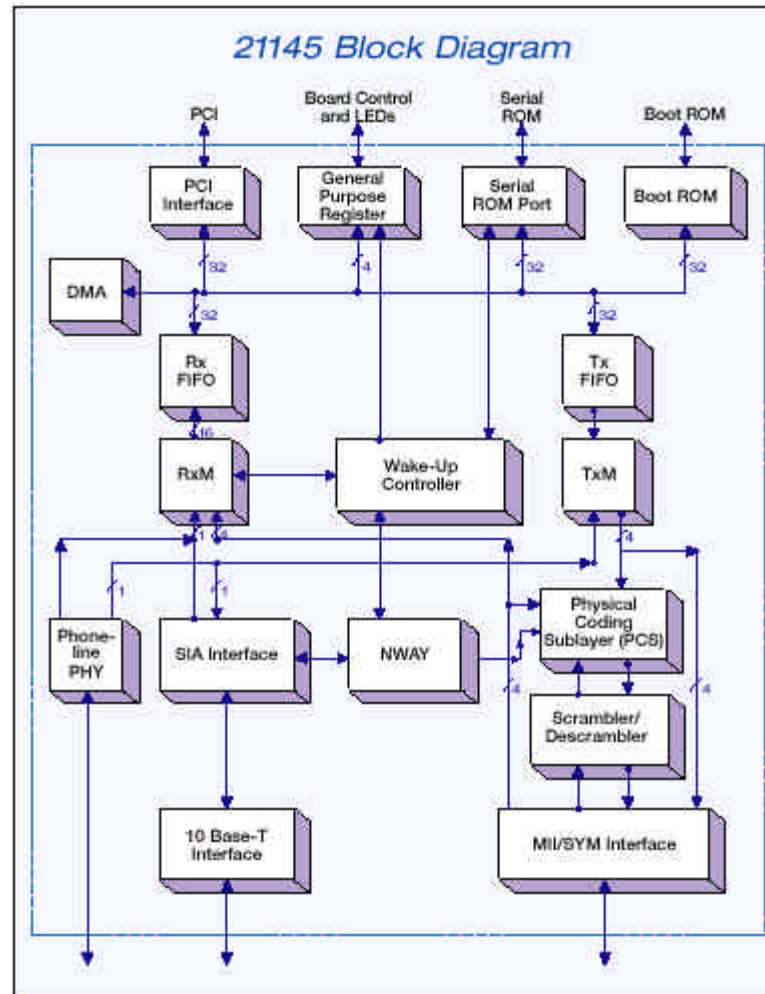
Intel Corporation

- ◆ Believes that the existing phoneline infrastructure in the home is an excellent basis for implementing home networks today
 - Founding member of HPNA
 - Develops chipsets for home phoneline networking
 - Working with industry leaders to establish open spec for phoneline-based home networking
 - Powerhouse in this area through own efforts & acquisition of Level One Communications

Intel Corporation

- ◆ Intel 21145 Phoneline/Ethernet LAN Controller
 - Integrated single-chip silicon solution for 1Mbps phoneline & 10Mbps Ethernet connectivity
 - Provides foundation for implementing fully functional home phoneline network
 - Utilizes 21x4x MAC core for 10Base-T Ethernet network
 - Fully compatible with HPNA 1.0 spec
 - Fully compliant with the IEEE 802.3 & ANSI 802-3 Ethernet standards
 - PCI interface

Intel - 21145 Phoneline/Ethernet LAN Controller



Source: Intel Corporation

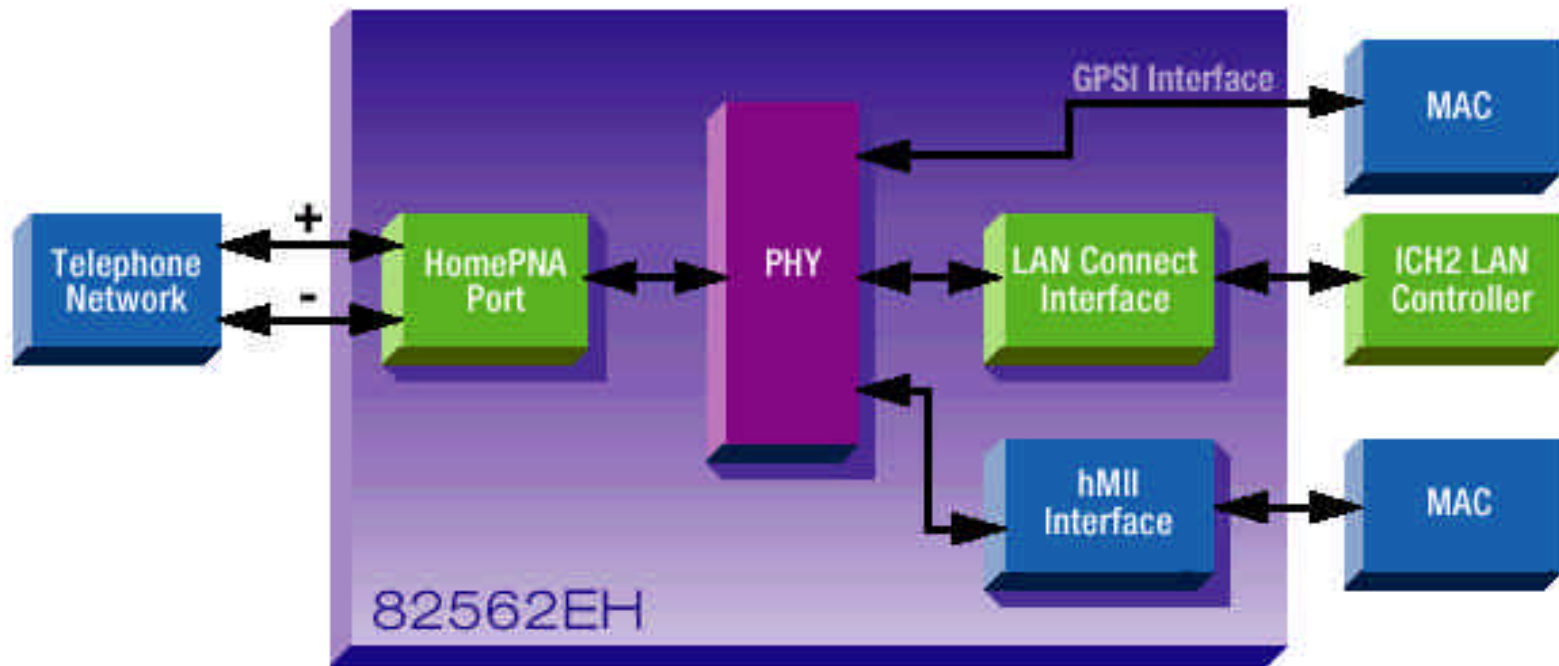


Intel

- ◆ Intel 82562EH - HomePNA LAN Connect Option
 - Highly-integrated, low cost, fully flexible network component ideal for use in a wide range of home networking designs
 - Fully compliant with HPNA 1.0 and includes a 1Mbps HomePNA port for connection to home telephone with three data interfaces
 - LAN Connect Interface for connecting Intel I/O Communications Hub2 (ICH2)
 - HomePNA Media Independent Interface (hMII)
 - General Purpose Serial Interface (GPSI)
 - Targeted for LAN-on-motherboard (LOM), Communication and Networking Riser Cards (CNR), set-top boxes, residential gateways or network information appliances
 - Supports Wake-On LAN
 - Low power consumption

Intel - 82562EH

HomePNA LAN Connect



Source: Intel Corporation



Lucent

- ◆ Home Wire chipset products
 - Create inexpensive home networks using copper phone wires
 - Provide easy interface to communication products such as DSL modems & Ethernet
 - Data transmission rates from 1Mbps to 16Mbps
 - Compliant to HPNA 2.0 10 Mbps spec, backward compliant
 - Allows
 - Fast in-home Web surfing & high bandwidth file transfer
 - Download video & graphics
 - Connect more devices to home networks
 - Multimedia & real-time applications
 - In-home video distribution, voice compression & VoIP

Lucent (contd.) - Products

- ◆ HW3000S Home Wire MSI Controller
 - Integrated 1/10 Mbps device
 - 16 bit microprocessor slave interface
 - Glueless interface to analog front end
 - Interfaces to ADSL modem chip set
 - Ideal solution for broadband residential gateways (DSL, cable modem) & other in-home networking appliances

Lucent (contd.) - Products

- ◆ HW3130 Home Wire PCI/Cardbus HPNA/LAN/Modem Controller
 - Integrated 1/10 Mbps device with a dual speed 10/100 Mbps LAN Controller
 - Interfaces to 10/100 Mbps Ethernet PHY
 - Ideal solution for triple-function PC add-in card
- ◆ HW3100 Home Wire PCI/Cardbus HPNA/Modem Controller
 - Integrated 1/10 Mbps device
 - Support for 56 Kbps modem
 - Ideal solution for dual-function PC add-in card

Lucent (contd.) - Products

- ◆ HW3000M Home Wire MII PHY
 - Integrated 1/10 Mbps HPNA PHY device
 - Media Independent Interface to an external 10/100 Mbps Ethernet MAC
 - Ideal solution for PC and Embedded motherboard applications
- ◆ HW2000 Home Wire Analog Front End
 - Fully integrated analog front end transceiver for HPNA 2.0 10 Mbps home networking



Equipment OEMs

2Wire

- ◆ Specializes in ADSL and HomePNA based RGs
- ◆ HomePortal products
 - Dubbed as the “Intelligent ADSL Residential Gateway”
 - Fully integrated ADSL & home networking platform providing high-speed data, telephony, & digital video services over standard phone lines
 - Combines DSL modem, home networking hub, router, Web server & firewall security in a single package
 - Compatible with 10/100 Ethernet, USB, HomePNA 2.0
 - Teamed up with Proxim, Inc. to offer Proxim’s HomeRF wireless technology for use with HomePortal
 - Provides wireless connectivity in the house

3Com

- ◆ 3Com RG

- Integrates DSL & cable modems and home networking functionality
 - Ethernet, HPNA &/or RF functionality

- ◆ Bridges

- Products connecting to a digital modem & through RF or phonelines to the home networking
- Bridge between Internet (PC/modem) to home networking (intermediary device) without tying all the functionality into one device

Arris/Nortel

- ◆ Arris is a joint venture between Nortel Networks & ANTEC
- ◆ Arris Cornerstone product line
 - Delivers voice & data over cable networks for cable telephony
 - Tested and deployed by AT&T/TCI
 - Voice Port
 - Includes both indoor & outdoor devices with 2 ports on up
 - Switched voice capability only
 - Packet Port products
 - Support packetized data & voice over IP on a HFC network
 - Will support life line phone & service such as 911

Cayman Systems

- ◆ DSL specialist
- ◆ ADSL 3220H products - Internet Gateway
 - Will incorporate Proxim's SWAP/Open Air add in module to its ADSL 3220 router
 - Termination of DSL service
 - HomeRF connectivity for data & voice applications
- ◆ Developed relationship with Pacific Bell to supply ADSL routers & Internet Gateways

Cisco Systems

- ◆ Wide range of consume initiatives working with a number of partners to put Cisco technology into consumers' homes
- ◆ Will NOT sell home networking equipment to end consumers and will focus on
 - Working with service providers to seed high-speed Internet access services for customers
 - Licensing Cisco technology for cable & DSL modems to consumer electronics manufacturers
 - Forming partnerships with other consumer electronics & Internet companies

Cisco Systems

- ◆ Cisco uBR924 Universal Broadband Router
 - Will provide telephony, data and video services
 - DOCSIS compliant CPE device
 - 2 voice ports, 4 data ports & a cable port for telephony, built in Ethernet hub & IPsec support for VPNs
 - Will support multiple services
- ◆ Cisco has formed
 - Partnerships with ShareWave & Echelon
 - Alliances with GTE & Sun Microsystems to test Internet-enabled home products & services

Cisco System's iHG

- ◆ iHG - Internet Home Gateway family of devices provide
 - High-speed
 - Termination for DSL service
 - Data, voice & video communication over a single, always-on broadband connection (HomePNA networking)
 - Represents the new focal point of home communications providing
 - Infrastructure control
 - Simple
 - Intelligent networking services
 - Seamless integration of data, voice & video to deliver new services to the home

Cisco - iHG

- ◆ Flexible architecture
 - Incorporates open standards to interoperate with other standards-compliant products
- ◆ Provides QoS
 - Seamless support for data voice & video without configuration requirements
- ◆ Intelligent packet filtering
 - Certain traffic is permitted or denied by addresses or application types

Cisco - iHG

- ◆ Designed to enhance the online experience
 - Enabling services to the home
 - Unlike modems which are simple access devices
 - Unlike small routers designed for business applications
 - Provides the ability to network smart appliances
 - PCs, telephones, fax machines, DVD players, digital cameras, security systems, climate controllers, lights, utility meters & kitchen appliances
 - Requires no management from the user
 - Remotely manageable by a service provider
 - Easily provisioned
 - Remotely configured, monitored & tested by a service provider with no user intervention
 - Minimizes costly truck rolls

emWare & Invensys

- ◆ Funded by AT&T
- ◆ Invensys provides embedded chips
- ◆ emWare provides communications software solutions for networking e-smart devices
 - End-to-end solutions such as emGateway, emAccess
- ◆ Together provide a product: ControlServer
 - Contains emWare's device-networking software
 - Low cost control for home systems & appliances

Emerald Gateway International

- ◆ Product: Energy Service Gateway
- ◆ Metering, load control, home security, home control functions (CEBus based)

Ericsson

- ◆ Most active in the home networking & RG market
 - Founding member of the OSGi
 - Pushing the e-services concept
 - Market where network operators use a RG such as the e-box
 - Then allow different vertical service providers use the CPE equipment to distribute their services on the network operators infrastructure
- ◆ Developed an RG called the e-box
 - Positioned as an 'Open Services Gateway'
- ◆ Also sells e-manager 901 Service & Management Center
 - Hardware & software targeted at network operators that provisions services & Internet access to end user

Ericsson e-box Architecture

- ◆ PC based architecture
- ◆ 32 bit CPU
- ◆ 8, 16 or 32 MB of DRAM memory
- ◆ 4, 8 or 16 MB of Flash memory
- ◆ 128 Kb of SRAM, battery backed
- ◆ LONWorks interface for home control functions
- ◆ Two I/O slots for PCMCIA cards
- ◆ RS232C Port



Source: Ericsson

Ericsson e-box

- ◆ PC architecture with no moving parts
- ◆ Has a Java Virtual Machine
 - Intended to allow for software downloads via the access network
- ◆ Currently supports Ethernet & LONWorks for home networking interfaces
- ◆ Will support Bluetooth, HomePNA, SWAP
- ◆ Targeted for \$400-500

General Instrument/Motorola

- ◆ Working on a 'Communications Gateway'
 - Will connect to the network via a HFC feed & then offer 4 basic lines of telephony service
 - Will be network powered
- ◆ Owns 80% stake in Next Level Communications
 - Investment into RG pie

Global Converging Technologies

- ◆ Product - Cendis

- Scaled down PBX that supports up to 4 voice lines
- Limited data support
- System consists of a RF base station plus two cordless phones
 - RF channels run over a 900 MHz spread spectrum on technology provided by Butterfly Communications
- Currently supports control protocols such as CEBus & LONWorks, but in future will support higher speed data networking protocols such as HPNA and HomeRF

- ◆ Product - Netdisplay

- Web pad

IBM

- ◆ Developed deals with system integrators such as Ameritech
- ◆ Cofounder of OSGi
- ◆ Home Director home network connection center
 - In-home hub for different types of media such as Cat 5, copper wiring, coax & POTS wiring
- ◆ Intelligent Gateway
 - PC based architecture
 - 486 processor, 4Mb of flash, 16Mb of RAM
 - Control is based on CEBus, HPNA, HomeRF

Intel

- ◆ AnyPoint brand of home networking products
 - HomePNA and HomeRF based home networking

Motorola

- ◆ Leading cable modem vendor
 - Owned 39.1% of the cable modem market share
- ◆ Bought leading set-top box - General Instrument
- ◆ Purchased 2-3% (\$10 million) stake in Proxim
 - Co-development of HomeRF based cable modem products
- ◆ Actively developing RG products - "Broadband Gateways"
 - Comes in two flavors
 - DOCSIS cable modem with HPNA based home phoneline LAN interface
 - DOCSIS cable modem with HomeRF LAN interface
 - Will deliver more intelligent services

Motorola (General Instrument)

- ◆ GI used to be the largest set-top box manufacturer
- ◆ 1998 had revenues of \$2 Billion & shipped ~5.7 million set-top boxes
- ◆ Partnered with Cisco Systems for the AT&T/TCI network
- ◆ GI is trying to focus its DCT-5000+ digital set-top box as a residential gateway incorporating
 - Cable modem technology
 - Broadband Telephony Interface (BTI)

Next Level Communications (NLC)

- ◆ Limited partnership between Spencer Trask Company & General Instrument (GI is now part of Motorola)
 - GI is a limited partner with an 80% equity stake in NLC
- ◆ Field trials are on with US West-Quest in Phoenix, AZ
 - Providing voice, video, data services over one line as part of US West's TeleChoice Digital TV and on-line services
- ◆ Partnered with Proxim to integrate Proxim's HomeRF technology into NLC's ultra high-speed RG
 - Distribution of toll-quality cordless voice & shared broadband Internet access wirelessly in and around the home

Next Level Communications (NLC)

- ◆ N3 - In-home RG
 - Access point for VDSL over twisted pair copper
 - Set-top box incorporating several MPEG decoders
 - Handles multiple concurrent MPEG streams at one time & can tune up to 3 TVs concurrently
 - Has a 10Base-T Ethernet hub & S-Video output
 - Uses a Motorola 860 RISC based processor
 - Uses VX Works from Wind River Systems as its RTOS
 - No hard drive disk currently
 - Next generation will incorporate a HDD

Nokia

- ◆ Released first Home Gateway product - Nokia MW 1122
 - Provides high-speed, wireless Internet connectivity & access to multiple device within the home & SOHO environment
 - Combines wireless LAN & ADSL
 - Simplifies access to data services by providing multi-megabit wireless connectivity for several interoperable devices
 - Precursor to a number of sophisticated Home Gateway networking solutions

Pace Micro Technology

- ◆ World's largest dedicated manufacturer of set-top boxes
- ◆ Model: Set-top Box evolves into a RG
 - Phase one: Set-top box - Broadcast TV into the home
 - Phase two: Creating the home gateway - High speed two way data access into the home
 - Phase three: The networked home - Home gateway delivering information around the home
- ◆ Believes that the TV remains fundamental to the consumer proposition
 - Interactive services offer incremental revenues

Panja

- ◆ New name for the company formerly known as AMX
- ◆ Wholly owned subsidiary of PHAST
 - Specializes in the design & manufacture of industrial & residential control & automation systems
- ◆ Internet Home “Entertainment Gateway” - Panja 1000
 - Complete entertainment system controller
- ◆ Panja 2000 - “home control and information gateway”
- ◆ Coupling hardware with suite of software & services that enable the delivery of Internet content

Panja

- ◆ “Entertainment Gateway” - Panja 1000
 - Connect the Internet directly to stereos, TVs, VCRs
 - Delivery of IP content is enabled through a cobranded Cisco cable modem
 - Uses Motorola Coldfire processor operating at 70MIPS
 - home networking interfaces include Ethernet port, HPNA & HomeRF
 - Has a DCP server to handle IP subnet allocation
 - User interface is a handheld touch panel operating at 2.4GHz spread spectrum channel
 - Price: \$1000-2495
 - Located in the entertainment closet

Panja

- ◆ EP3 (Entertainment Processing Level 3) - Software
 - Selects and decodes MP3, MPEG, Real Audio, Real Video & other encoding schemes
 - Offered in conjunction with its Panja 1000 & 2000 gateways
- ◆ Partnered with Infoseek/Go Network which will offer content as the basis of entertainment oriented Broadband Blast service

Panja

◆ Services

- Broadband blast
 - Multimedia service tailored for delivering MP3, MPEG video & other multimedia content to non-PC devices such as TV, stereo
- IControl
 - Internet based home control service that allows subscribers to access their homes remotely for control & security
- PanjaCast
 - Personalized information delivery service to Internet appliances such as webpads

Philips (Royal Philips Electronics)

- ◆ No. 2 position in worldwide set-top box market
- ◆ Central Gateway home server
 - Concept
 - Integrates a broadband receiver, home network system, a variety of storage systems in one box
 - Capacity to perform multiple tasks using the home networking in different rooms
 - Wireless IP telephony; watch, record & playback video programs; Bluetooth-based wireless download of MP3 files, remotely record MP3 files on a CD, simultaneous Web surfing on a web tablet

Philips

- ◆ Central gateway
 - Advanced home server system code named “Rooster”
 - Runs on 2 TriMedia processors
 - Sports 3 V tunes to watch, send & record video, 16MB of RAM, DVD player/recorder, CD recorder, 27GB HDD
 - Provides connections to the Internet, wireless IP telephony, full infrared and Bluetooth based home networking
 - Voice operated
 - Offers profile-based service
 - Fingerprint recognition system embedded in its small touch screen-based remote control unit communicates the fingerprint information to the home server, which can then identify the user
 - Sorts out user’s preferred music & video selections to make navigation easier

Proxim

- ◆ Leading supplier of
 - Spread spectrum wireless LANs (IEEE-802.11) products
 - HomeRF products for interoperable cordless consumer devices - home networking
- ◆ Harmony software products
 - Provide interoperability with both HomeRF & IEEE802.11 stds.
 - Will include PC card, USB card & a cordless design-in module for radio integration within OEM products
 - Add in module is a contributing technology for a RG
 - Enables an access termination device to then connect other connected devices that support HomeRF protocol
 - Has a radio and MAC on the module
 - 2/3rd the size of a business card

Proxim

- ◆ Motorola & Intel have each purchased minority shares to leverage Proxim's expertise in wireless networking
 - Both companies have announced RGs with Proxim card
- ◆ Teamed up with 2Wire to offer HomeRF technology for use with ADSL-HomePNA RG
 - Provides wireless connectivity in the house
- ◆ Teamed up with Next Level Communications (NLC)
 - Integration of Proxim's HomeRF wireless networking technology with NLCs Nlevel3 Unified Access Platform
- ◆ Cayman Systems will use a Proxim add in module in its ADSL RG-modem

Sage Systems

- ◆ Product: Aladn Energy Management Suite
 - Proprietary PLC technology for energy management
 - More than 1 million AMR devices sold to China

Scientific Atlanta

- ◆ Second largest manufacturer of set-top boxes behind General Instrument
 - \$1.16 Billion in revenues & ~3.3 million set-top boxes shipped in 1998
- ◆ Sold off Maingate control systems division
 - Maingate Customer Communications System is a low data rate system targeted for utilities for tasks such as AMR
- ◆ Will focus on broadband RG market
 - Expand & have its digital set-top box, the Explorer 2000 take on added RG functionality

Scientific Atlanta

- ◆ Explorer 2000
 - Currently has a TCP/IP stack & DAVIC MAC layer functionality
 - The box uses the powerful Micro Sparc 2 processor which can handle TCP/IP protocol processing
- ◆ Future developments
 - Explorer 6000 with more processing power
 - Will include features such as disk drive interface for local caching
 - Convert the box into a true entertainment 'edge server'
 - Development will be based on OSGi & H.323 standards

ShareGate

- ◆ Formerly called Utel
- ◆ RG product called 'Universal Communicator'
 - Generate ring voltages, dial tones & handle multiplexing of different simultaneous phone conversations
 - Remote software addition would turn the device into a small PBX that supports caller ID, intercom & other features
 - Support multiple LAN interfaces such as HomeRF, HPNA & CEBus
 - Will have a Java Virtual Machine for running applications & supporting OSGi software stack
 - Include a RISC processor, some RAM & flash memory
- ◆ Product: ISIS & Jupiter Gateways

ShareGate

- ◆ ShareGate DSL 2000 Residential Gateway
 - Distributes broadband services in home/small office enabling two-way, high-speed Internet, voice & video communications
 - Multiple digital phone lines
 - Provides up to 4 VoDSL lines, plus the standard existing telephone line & data line within one small box
 - Provides simultaneous operation of all lines
 - High speed Internet access using existing phone wires within the house to multiple PCs
 - Home Web Portal - Securely access home PCs from remote location via standard Web browser
 - Gateway management software for remote provisioning, service management, diagnostics, service upgrades
 - Security - Firewall protection

Sony

- ◆ PlayStation gaming platform turned into 'mobile gateway'
 - New model of Playstation - named PlayStation 2 PSone
 - Support broadband network services for mobile applications
 - 4-inch TFT display attachment
 - Can be carried from room-to-room and into the car
 - Bigger than a portable CD player
 - Not battery operated