

- ► Home: Communications industry's ultimate challenge
  - > Delivering vast and advanced applications -(data, voice, video, security, intelligent home.....)
  - > Utilizing available networking media on premises (phone line, power line, wireless each with shortcomings)
  - > Satisfying consumer budget & Mom-and-Pop behavior (limited IT skills, demanding simplicity)

## ►

- ► Avinta Communications, Inc.
  - > Premises network systems company
  - > Provide advanced solutions that address market needs and promote technology potentials
    - Robust network architecture, technology integration, and system engineering disciplines
      End-user-oriented philosophy and patented core technology suite
  - > Develop best-of-breed product
    - Embracing new technology with proven product features and engineering disciplines
    - Synergized performance, accelerated maturation and time-to-market, enhanced user experiences, improved market response
- Project Phoenix
  - > The Greek mythological Phoenix symbolizes "Rebirth of peerless beauty and excellence"
  - > Our project emblem reflects our vision and commitment for new-generation premises networks
    - Converged services, enabling advanced HES (Home Electronic System)
    - Versatile, flexible, high-performance
    - Consumer-oriented
    - Low cost of ownership
- Presentation Outline
  - > Problem & Solution (Problem Definition, Avinta Solution, Realization Example)
  - > Avinta (Advantages, Core Technology, Market Strategy)
  - > Technical Justifications (Product Block Diagram, Ethernet)



- Dilemma of today's Home Electronic System (HES)
  - > The Good The Bad The Ugly
- The Good (The Dream)
  - >Wide selection of home electronics products which are very effective in each of their own categories (i.e. TV/DVD/video games/entertainment systems) and affordable to the average household
  - ➤ Enormous application potentials
  - ≻Sky's the limit

► The Bad (The Barrier)

- >While individual systems are effective on their own, they generally have to be operated separately,
- > Don't link to one another in a straightforward manner, are difficult to customize, and confusing to troubleshoot.
- > Ad hoc & non home-centric end-to-end mingled services

The Ugly (The Reality)

- > Overwhelming propositions and confusions to consumers
- > Most products operate in isolation, without tapping into their true potential through interoperation.
- Broadband networking can be broken down to three general levels:
  - > Infrastructural architecture
  - ≻ Medium and transport, then
  - ➤ Application and services
- Current offerings all emphasize on the last one by pulling parts of the first two to make the offering functional.
  - > Without properly addressing the foundation, product or service falls apart as soon as any variation is desired by the consumer.
  - >Worse yet, even troubleshooting abnormalities of a product itself is not straightforward, because they often lead to secondary issues.
  - > These create a lot of TechSupport business opportunities which are actually very negative to consumer
  - > Currently, consumers have been enduring these frustrations because they do not know of any alternatives.

• Avinta's approach starts from building a firm foundation.

- Consistent universal architecture is decided (our patents).
- Utilizes only capable transport technology (currently only HPNA3 qualifies) to verify that AvintaNET is realizable and compatible with current solutions.
- ► As far as applications, any and every one can be built on top of AvintaNET afterwards. So that they are all transparent to AvintaNET.



- Solution
  - > Encompassing and flexible underlying premises platform
  - > Premises-centric architecture
  - > MaP (Mom-and-Pop)-friendly features & products
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- Principles & Advantages
  - > Network demarcation: Clear & accountable service responsibilities, cooperative working relation, focused efforts
  - > Functional modularity: Product flexibility & interoperability
  - > User-centric products: Application-oriented & user experience
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- Gateway Link (GL)
  - Using InterOp Gateway (IG) pair, connects and integrates disparate HANs to form a more encompassing and versatile premises network
  - > Pair-wise integrations of several HANs
  - > IG0 can be eliminated, If GL and HAN₀ use the same technology,
  - $\succ$  Ethernet is the first candidate as the 'bridging" technology
- Residential Gateway (RG)
  - ➤ Serves as a gateway to WAN connectivity
  - ➤ Secures domestic traffic from leaking to WAN
  - > Provides a demarcation of WAN service delivery & troubleshooting
  - $\succ$  Multiple RGs coexist for additional bandwidth, performance, and redundancy

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- Once each HAN can be treated as an isolated island yet easily interconnected via IGs when desired, consumer can feel assured by building a HES from any facility that is ready. Currently, HPNA3 and xDSL over phoneline is the first qualified combination.
- References:
  - ► ISO/IEC FCD 15045-2 Residential Gateway Pt. 2 Modularity and Protocol
  - > ISO/IEC CD 18012-2 Guidelines for Product Interoperability Part 2
  - >ISO/IEC/SC25/WG1-N1139 Unifying HomeGate & Interoperability Models



- A typical home or small office would have any one of mixture of the following products:
  Data: PC, Printer, Storage, Scanner, etc.
  - > Voice: dPABX Telephony, Intercom, etc.
  - > Entertainment: Music, TV, DVD Player, Game, etc.
  - Home Automation: Security Alarm, Utility Meter Reading, Energy Management, Appliance Monitoring, etc.
  - > Telemedicine: Vital Signs, Chemistry Balance, Medicine dosage, etc.
- ►
- ► PETS (Plain Enhanced Telephone Set)
  - > Multifunction device: analog phone + digital phone + distributed PABX + router
  - > Deployed at each service locale
  - > Interconnected via Cat-3 on-premises phone wiring
  - > As a analog phone, provides lifeline service, dPABX, and basic network connectivity diagnostics
  - > As a digital phone, permits multiple concurrent digital-mode phone calls with the provisioning of multiple digital channels over the broadband
  - > As a router with multiple Ethernet ports, supports multiple End User Terminals (EUTs).
- ENID (Enhanced Network Interface Device)
  - > Residential Gateway for the converged premises network
  - > Deployed at WAN-HAN service delivery & trouble shooting demarcation
  - > Conventional NID + broadband networking modules
  - > May be powered by Telco, hence extends lifeline service to broadband



- Network Convergence
  - ≻Data & voice
  - > Enhanced functions & features dPABX
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- Premise-Centric Network Architecture
  - > Agnostic to various home networking media (wired and wireless)
  - > Enhanced premises network by integrating disparate HAN segments
  - > Best-of-breed implementation with flexible deployment schemes
  - > Data security through traffic isolation at HAN-WAN interface
  - > Service demarcation for clear service delivery & troubleshooting responsibilities
  - > Supporting CE, intelligent home networking, & advanced WAN applications
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- Mom-and-Pop Friendly
  - > True PnP network deployment & reconfiguration
  - > Patented IP addressing scheme for subgroup and locale treatment
  - > Intuitive built-in diagnostic and performance measurement tools
  - > Swap-and-play recovery upon equipment failure



- Station controller for distributed single line PABX US Pat. No. 5,596,631
  - Enabling distribute PABX
- > Unified distributed voice and data local area networking US Pat. No. 6,456,633 Signal multiplexing scheme enabling integrated data and quality voice communication via a common transmission medium
- > Alternate wide area network access facility for locally networked computing devices US Pat. No. 6,512,760
  - Use of backup gateways for WAN links
- >User settable unified workstation identification system US Pat. No. 6,721,790
  - Subgroup and locale treatment of a networking device via special IP addressing scheme
  - > Unified voice and data networking having demarcation lines
    - US Pat. No. 7,051,090
      - Enabling a converged network with diagnostic demarcations
  - > Extended public switched telephone network architecture with enhanced subscriber control on call setup US Pat. No. 5,930,346
    - Expanding PSTN Numbering Plan
- Patent status

Avinta IP:

- ≻US: 6 awarded
- >International: 3 awarded, 1 pending



Market Entry

> AvintaNET modules applicable to all market sectors

> Initial entry point: SOHO market that has the ideal mix of characteristics

- Need to project professional image for competing against larger businesses
- Cost justifiable as office expense
- Like Residential, no resources for dealing with technical issues
- Less reliance on named vendor compared to established business
- More flexible to try new products
- Less price-sensitive than pure Residential
- > Expansion to Residential market after production ramp-up and cost-down
- Possible expansion to Small Enterprise and higher markets when transmission technologies become feasible
- Business Characteristics & Advantages
  - > Enables an on-premises networking business unregulated by government
  - > Build a follow-up profitable CE business over AvintaNET foundation



ID Dial

Functional subsystem, letting a user assign an ID (such as a telephone extension number, room number or a personal code) to a device

- ►
- ABR/ABG (Avinta Broadband Router/Gateway)
  - > Ethernet router with built-in ID Dial capability
  - > Deployed over HPNA3 network via an HPNA3 Bridge
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- ► ET (Enhanced Telephone)
  - >POTS enhanced with VN100 and ID Dial to provide dPABX functions
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- ► PETS (Plain Enhanced Telephone Set)
  - Conventional 2-line POTS incorporating broadband data modules (VN100, ABR/HPNA3 Bridge, and ATA), in its original housing
  - Provides converged services (video, data, analog and digital telephony, dPABX) over a single pair of phone line
- ENID (Enhanced NID)
  - Conventional NID (Network Interface Device) incorporating broadband data subsystems (xDSL Modem, ABG, HPNA3 Bridge), in its original housing
  - > Functions as a RG for WAN service demarcation
  - >Low-Pass Filter (LPF) provides a signal path for analog POTS
  - >ABG provides a path for broadband data and enforces data security between HAN and WAN



► Home Area Network (HAN) characteristics:

> Arbitrary-topology, multi-drop, peer-to-peer, behind-the-wall wiring, and uniform-interface device, etc.

## ► WAN-HAN-PAN Architecture

- > PAN: Forming a subgroup for devices within a locale for ease of management
- > HAN: Forming the premises network that internally interconnects PANs for local sharing, and externally connects to WANs for WAN services
- >WAN: Connecting to HAN via Residential Gateways to deliver services to the premises
- > Primary Demarcation: Clarifies WAN service delivery accountability and troubleshooting responsibility
- > Secondary and tertiary Demarcations: Enable modular substitutions for straightforward diagnostics
- > Available bandwidth capacities under this architecture fit well with application requirements
- ►
- Ethernet advantages as the "bridging" technology
  - > Agnostic to transmission medium
  - > High throughput performance
  - ≻Low cost
  - ≻ Simple & matured technology
  - > Ubiquitous and pervasive installed base
  - ➤ Available on most HAN devices and PCs
  - > Adapter between Ethernet and each WAN, HAN and PAN technology commercially available
- Note:
  - Physical Ethernet cables (Cat-5 and up), unless prewired within walls, should be confined within short distance due to personal safety concerns