Project Phoenix

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Avinta Communications, Inc.
142 N. Milpitas Blvd., #148, Milpitas, CA 95035-4401 U.S.A.
Tel: +1 (408) 942-1485 Web: www.Avinta.com

- 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)
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- Avinta Communications, Inc.
  - Premises network system sengineering 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
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- 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
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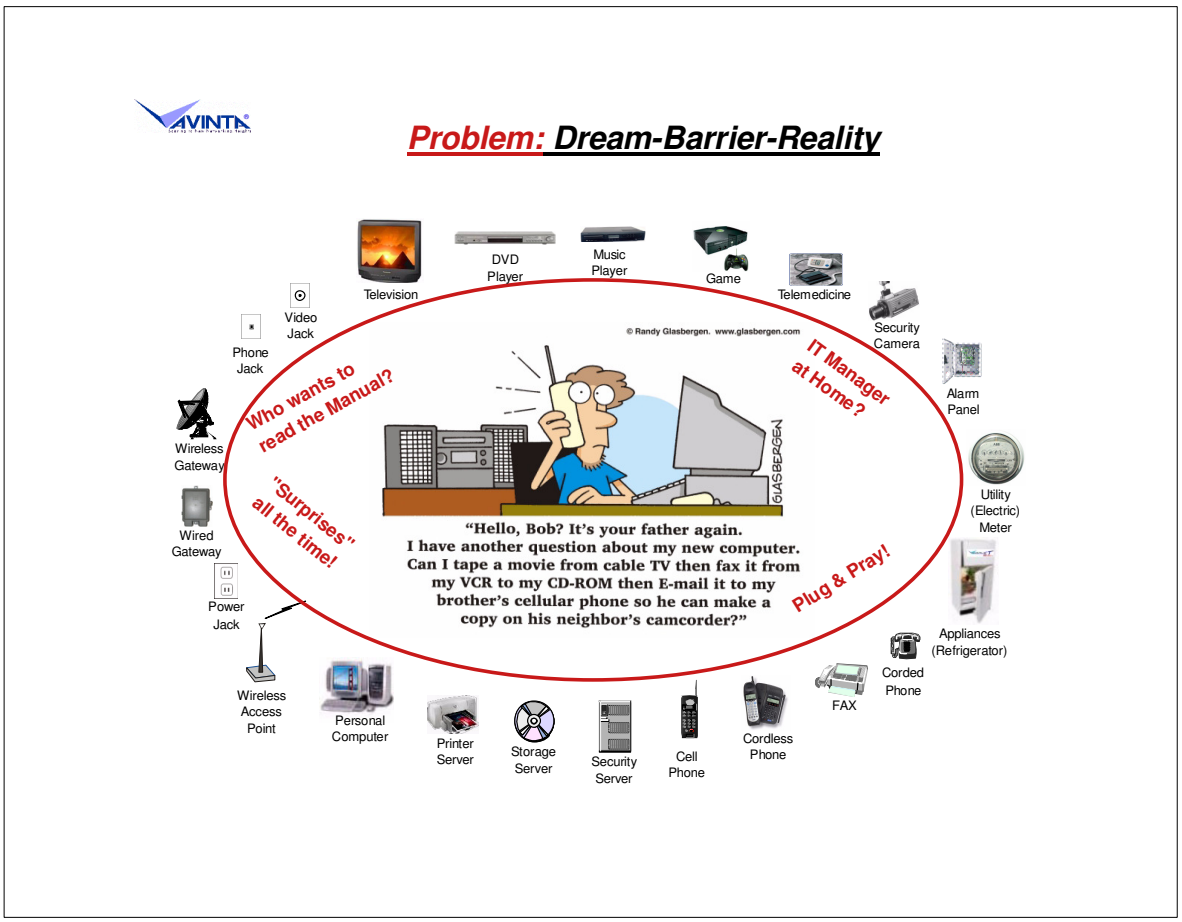
- Presentation Outline
  - Problem & Solution (Problem Definition, Avinta Solution, Realization Example)
  - Avinta (Advantages, Core Technology, Market Strategy)
  - Technical Justifications (Product Block Diagram, Ubiquitous Ethernet)



- Dilemma of today's Home Electronic System (HES)
  - The Good – The Bad – The Ugly
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- 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
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- 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
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- The Ugly (The Reality)
  - Overwhelming propositions and confusions to consumers
  - Most products operate in isolation, without tapping into their true potential through interoperation.
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- Broadband networking can be broken down to three general levels:
  - Infrastructural architecture
  - Medium and transport, then
  - Application and services
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- Current offerings all emphasize on the last one by pulling parts of the first two to make the solution 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
  - Consumers have been enduring these frustrations because they do not know of any alternatives.
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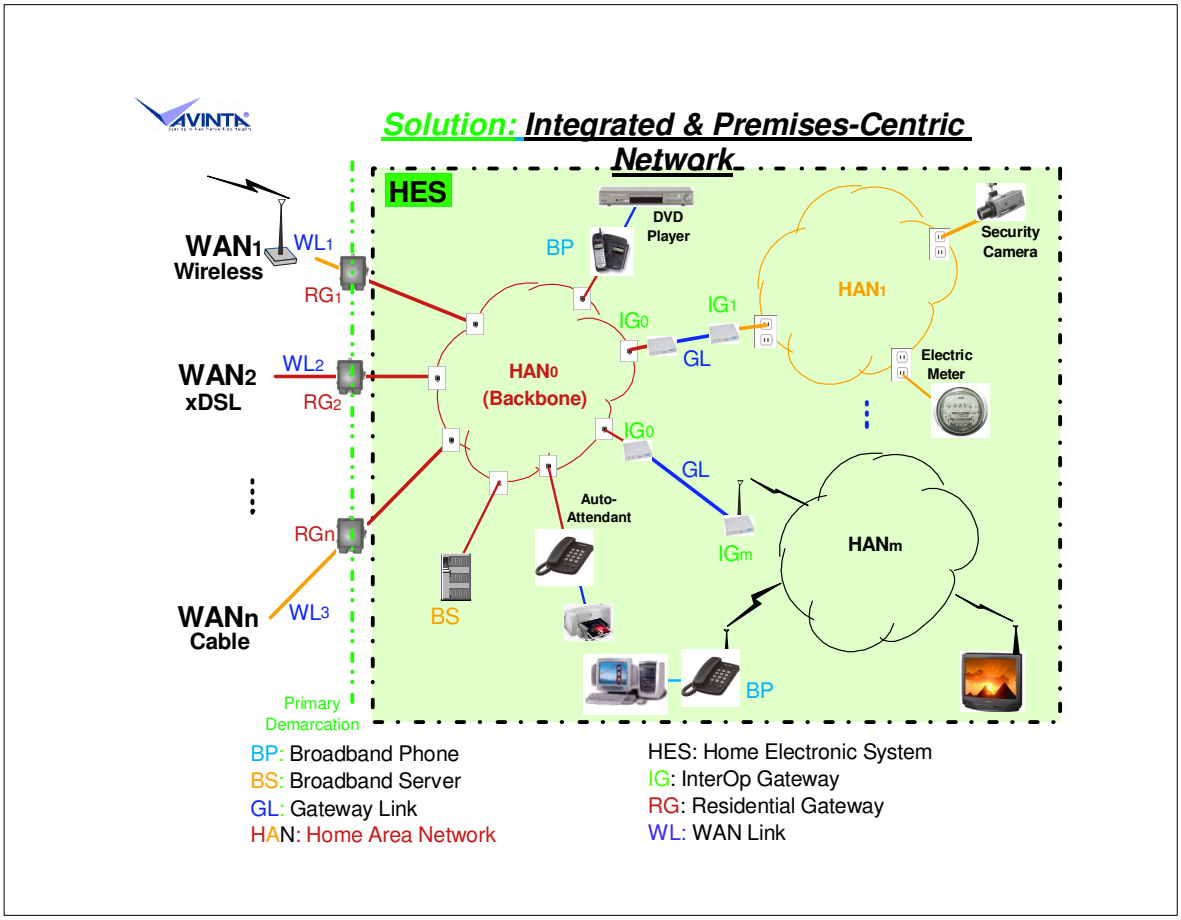
- Avinta's approach starts from building a firm foundation.
  - Consistent universal architecture, AvintaNET, is decided (our patents).
  - Utilizes only capable transport technology to verify that AvintaNET is realizable and compatible with current solutions.
  - Any and every application can be built on top of AvintaNET afterwards, because they are all transparent to AvintaNET.



- Solution
  - Encompassing and flexible underlying premises platform
  - Premises-centric architecture
  - Capable transport technology
  - 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-focused
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- Gateway Link (GL)
  - Using InterOp Gateway (IG) (technically, Network Adapter on PC's Ethernet port) 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 HAN_0 use the same technology,
  - Ethernet is the first candidate as the 'bridging" technology
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- 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
  - 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. Considering HDTV bandwidth, Security & Reliability, HPNA3 and xDSL over phoneline is the first fully qualified combination.
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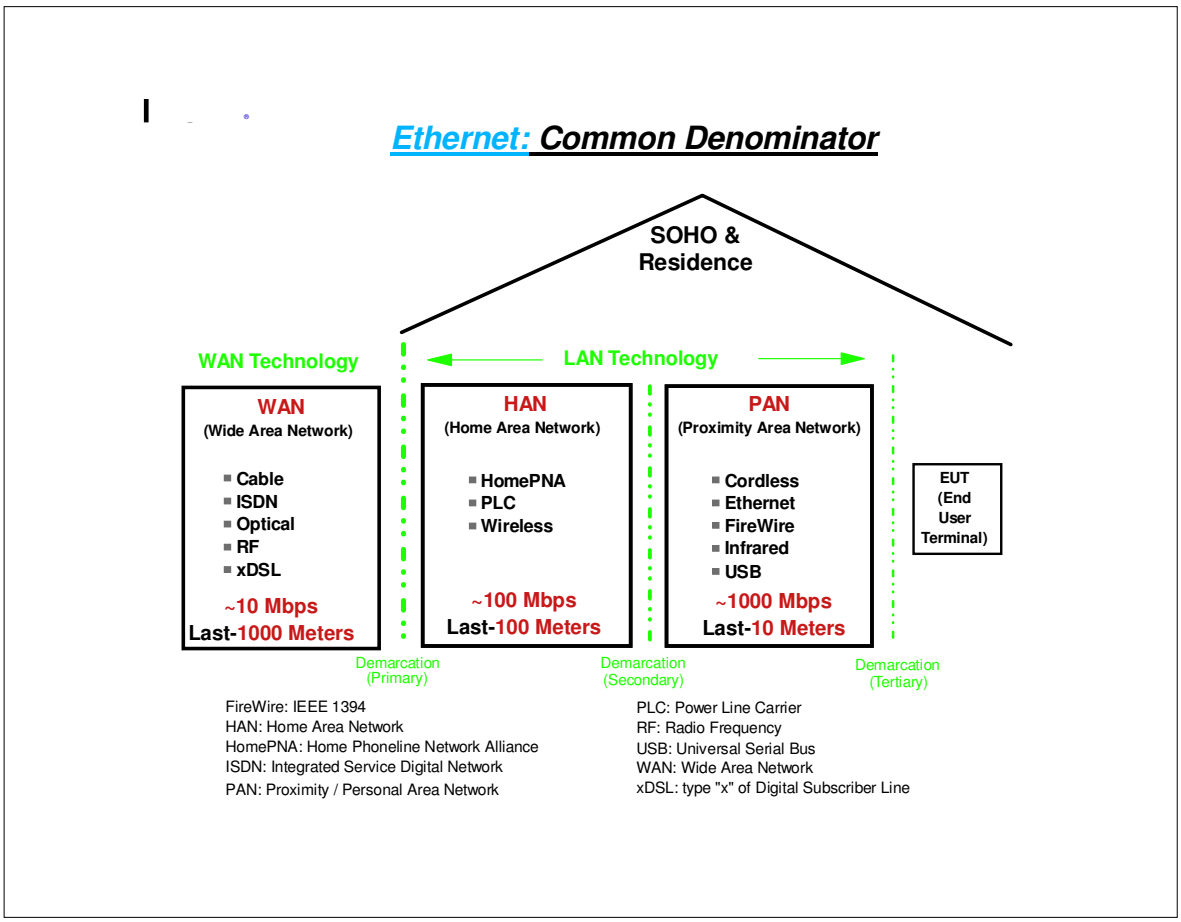
- References:
  - ISO/IEC FCD 15045-2 Residential Gateway Pt. 2 - Modularity and Protocol
  - ISO/IEC CD 18012-2 Guidelines for Product Interoperability - Part 2
  - ISO/IEC/SC25/WG1-N1139 Unifying HomeGate & Interoperability Models



- Home Area Network (HAN) characteristics:
  - Arbitrary-topology, multi-drop, peer-to-peer, behind-the-wall wiring, and uniform-interface device, etc.
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- PAN-HAN-WAN Architecture
  - PAN: Forming a subgroup for devices within a locale for ease of management
  - HAN: Forming the premises network that interconnects PANs for local sharing, and connects to outside for accessing 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 product substitutions for straightforward diagnostics
  - Available bandwidth capacities under this architecture fit well with application requirements
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- Ethernet as the "bridging" technology between transport facilities
  - Agnostic to transport technologies
  - 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
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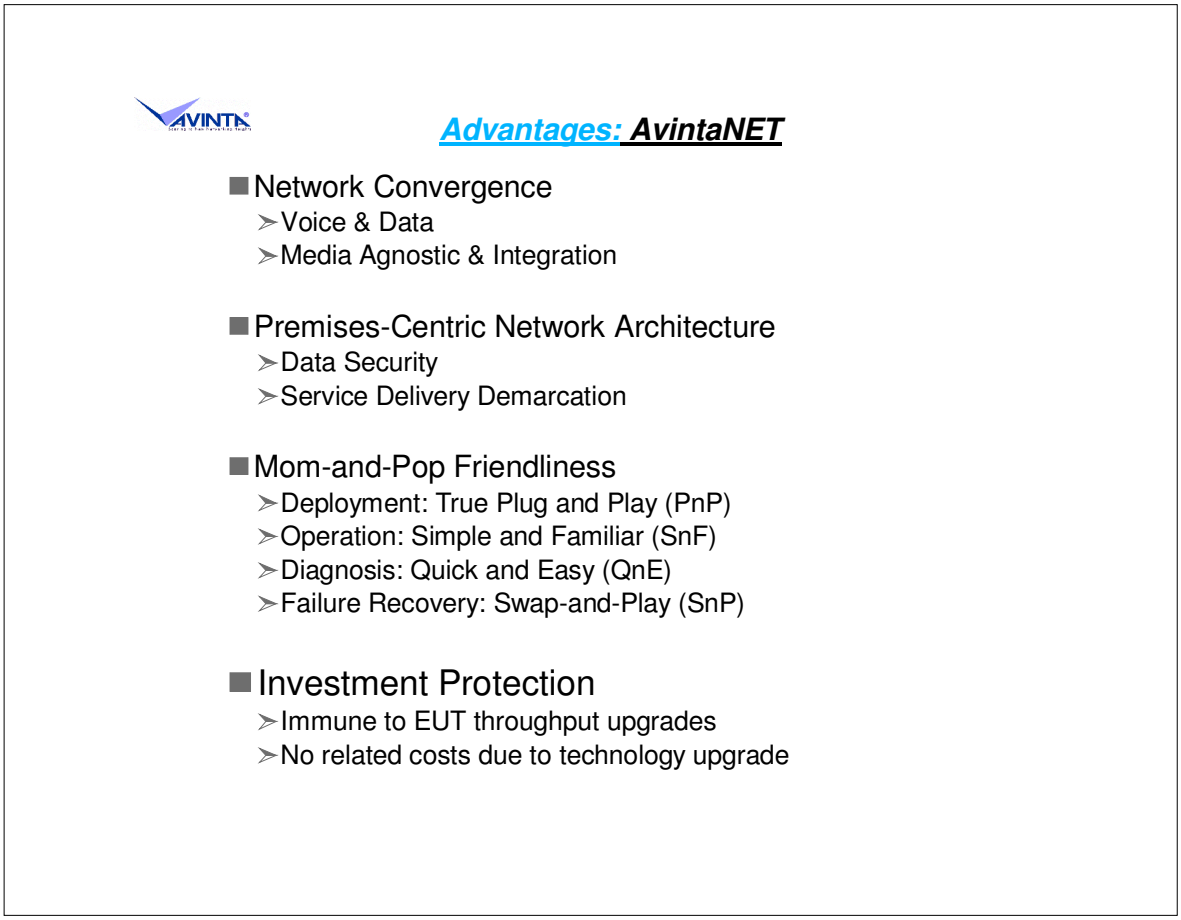
- Note:
  - Physical Ethernet cables (Cat-5 and up), unless prewired within walls, should be confined within short distance to avoid safety issues



- 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 clusters
  - 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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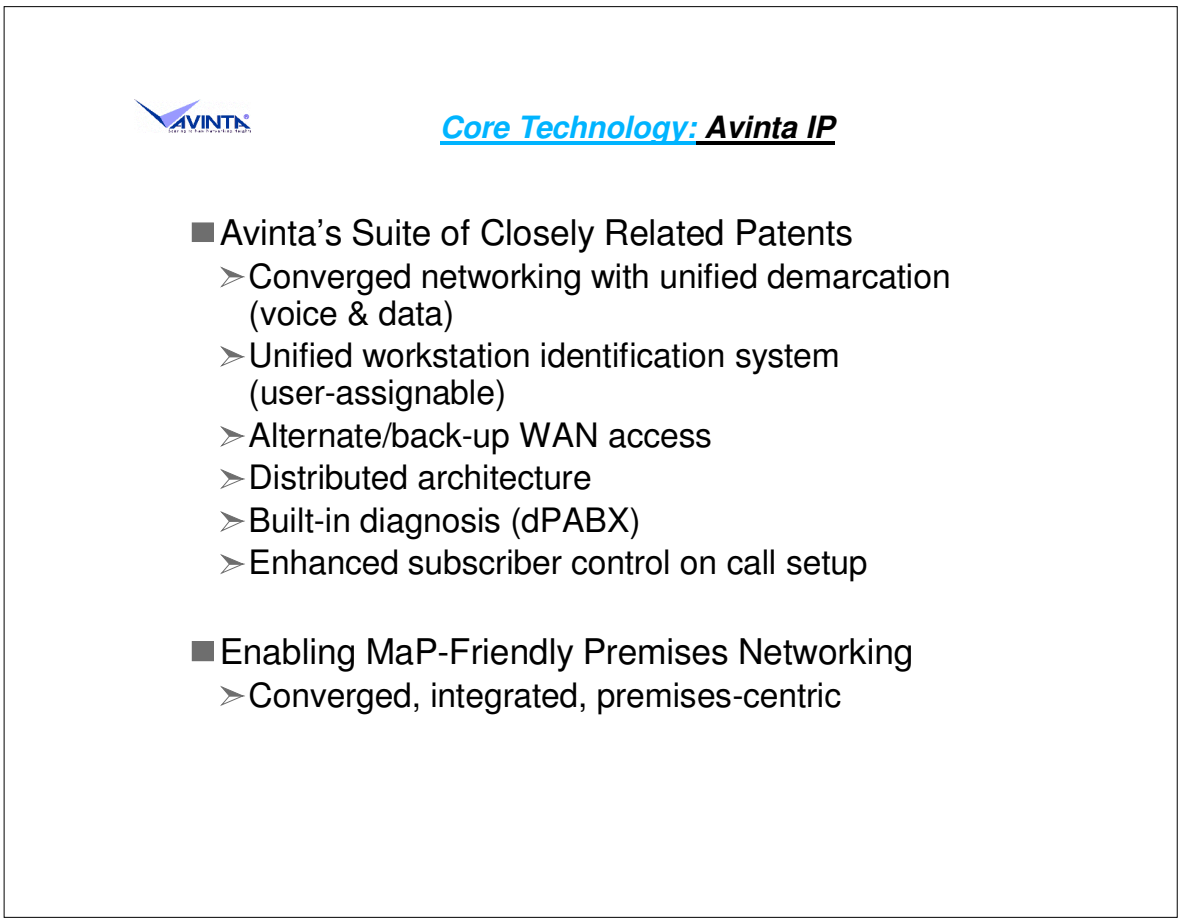
- Mom-and-Pop Friendly
  - True PnP network deployment & reconfiguration
  - Patented IP addressing scheme for subgroup and locale treatment
  - Intuitive built-in diagnostic and performance measurement tools
  - Swap-and-play recovery upon equipment failure



- Avinta IP: Suite of closely related patents collectively enabling converged, integrated, premises-centric, and Mom-&-Pop-Friendly networking
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  - Station controller for distributed single line PABX
    US Pat. No. 5,596,631
    - Enabling distribute PABX
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  - 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
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  - Alternate wide area network access facility for locally networked computing devices
    US Pat. No. 6,512,760
    - Use of backup gateways for WAN links
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  - 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
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  - Unified voice and data networking having demarcation lines
    US Pat. No. 7,051,090
    - Enabling a converged network with diagnostic demarcations
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  - Extended public switched telephone network architecture with enhanced subscriber control on call setup
    US Pat. No. 5,930,346
    - Expanding PSTN Numbering Plan
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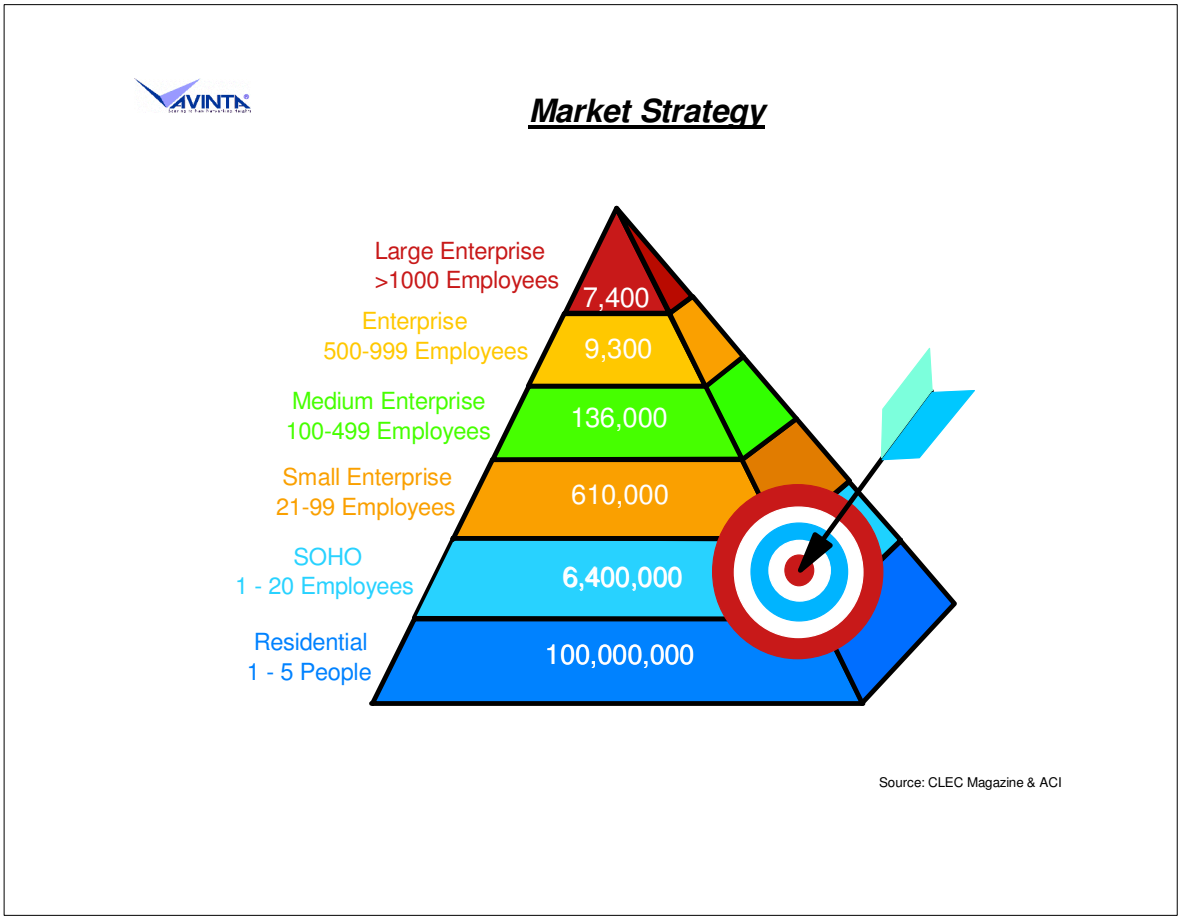
- Patent status
  - US: 6 awarded
  - International: 4 awarded



- Market Entry
  - AvintaNET modules applicable to all market sectors
  - Initial entry point: SOHO 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
    - Compared to established business, less reliance on named vendor and 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
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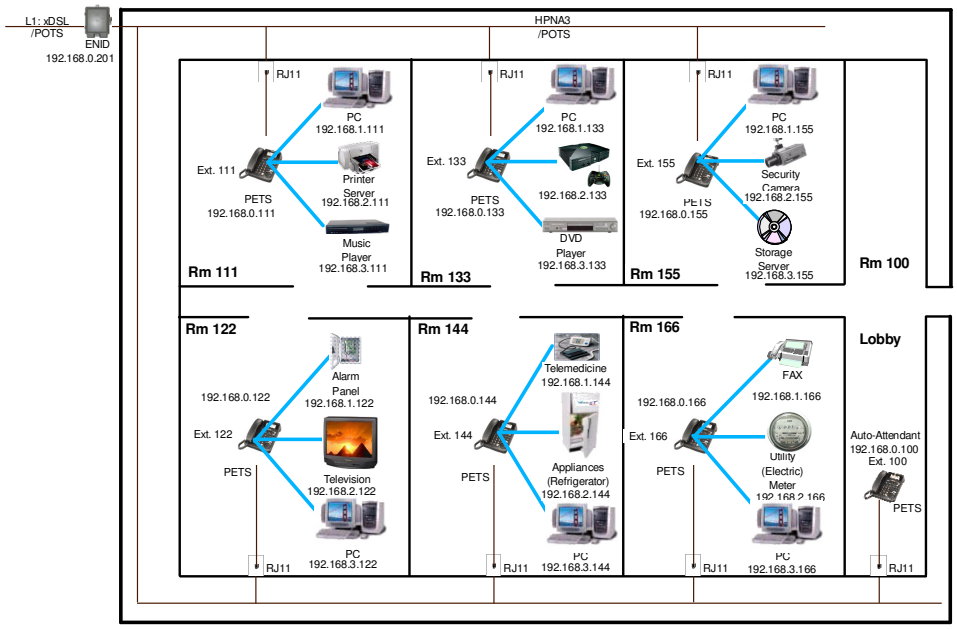
- Business Characteristics & Advantages
  - Enables an on-premises networking business unregulated by government
  - Builds a follow-up profitable CE business over AvintaNET foundation

Converged SOHO/Residential Networking

(Phoneline-Based Example)



http://www.avinta.com/aboutavinta-1/whitepaper/ModularPETSdemo.pdf

- A typical home or small office would have any one or 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.
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- 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 an 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).
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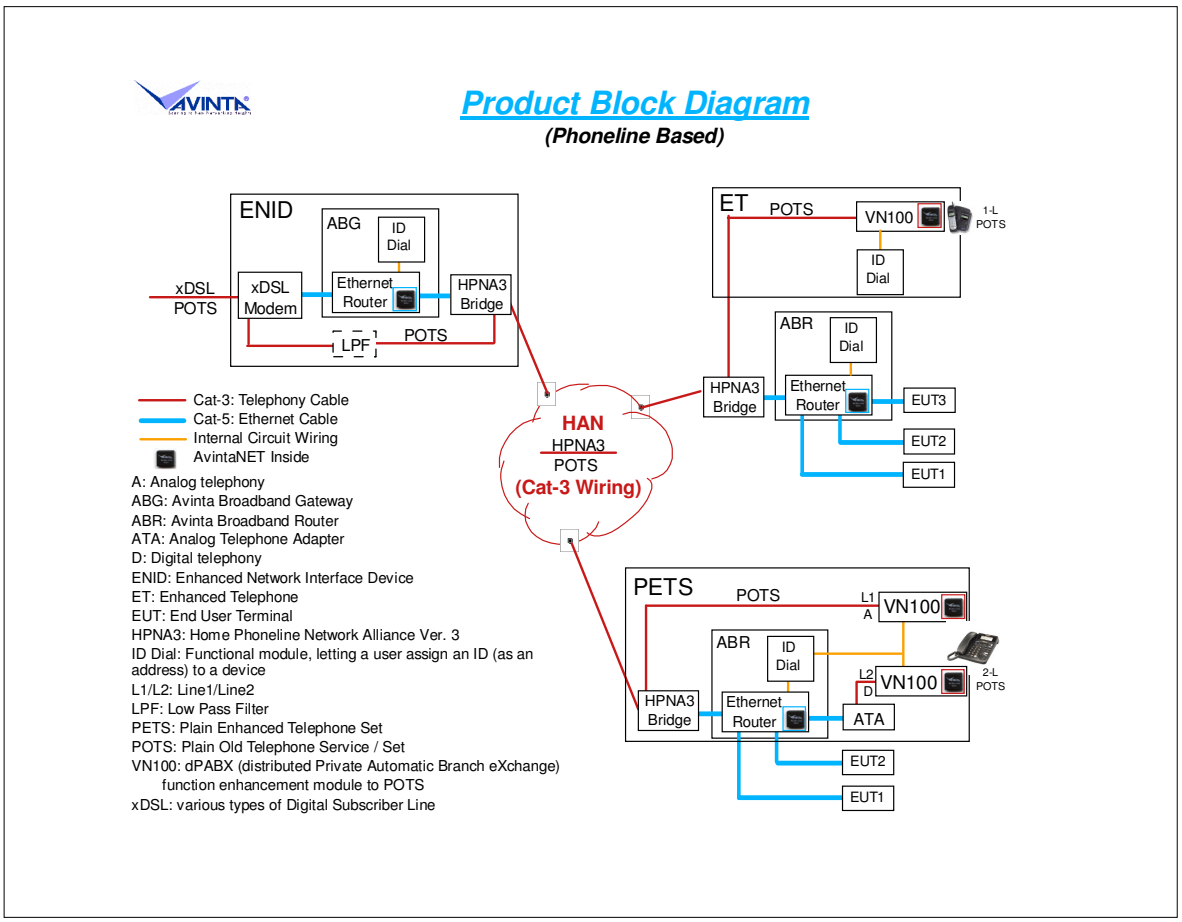
- ENID (Enhanced Network Interface Device)
  - Residential Gateway for the converged premises network
  - Deployed at WAN-HAN service delivery & troubleshooting demarcation
  - Conventional NID + broadband networking modules
  - May be powered by Telco, hence extends lifeline telephony service to broadband



- 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
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- 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
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- 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 facility for distributing WAN data and enforcing data security between HAN and WAN