e-Lifestyle Forum: Living Tomorrow's Lifestyle Today
11 April 2001, Wednesday
1:30pm

The Westin Stamford & Westin Plaza Hotel
Olivia Room, Level 4

Programme

1:30pm	Guests Arrival and Guests Registration
2:00pm	**Welcome Address** Mr Gerrard Ong, Chief Executive Officer iXccess Pte Ltd
2:10pm	**Introduction to iXccess Pte Ltd** Mr John Foo, Director, Infrastructure iXccess Pte Ltd
2:40pm	**Introduction to NORDX/CDT** Mr Hassan Sherif, VP, Business Development and International Sales NORDX/CDT
3:00pm	Tea Break
3:15pm	**"The Gigabit World"** Mr Paul Kish, Director of IBDN Systems and Standards NORDX/CDT
4:15pm	**Home Networking** Mr Herman Cárdenas, President/CEO, SMART
5:00pm	Questions and Answers
5:30pm	Cocktail Reception

e-Lifestyle:

Living Tomorrow's Lifestyle Today

11 April 2000

Presented By:
John Foo
Director, Infrastructure

iXccess

Agenda

- About the Company
- e-Lifestyle & Intelligent Buildings
- Services & Value Proposition
- Projects

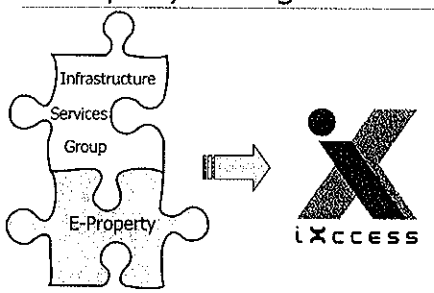
iXccess

About

iXccess

iXccess

Company Background



iXccess

Vision

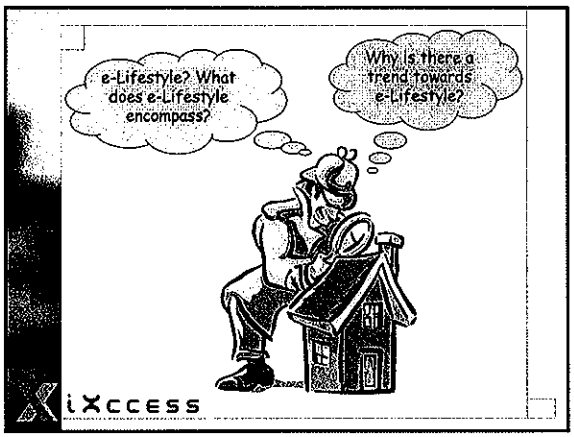
To be the leader in Intelligent Infrastructure Solutions, Products and Services for e-Lifestyle.

iXccess

Mission

- To be the **market leader** in the **Asia Pacific Smart/Intelligent Property market.**
- To serve the market needs with **competitive pricing.**
- To continually **develop and create value** for all our shareholders, customers and people.

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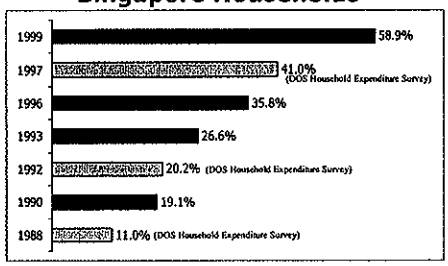


e-Lifestyles

- What is 'e-Lifestyle'?
  ... areas where the Internet affects our lives – the way we live, work and play.
- The Information Age is changing just about every aspect of our lives.
- Increasingly IT-savvy population

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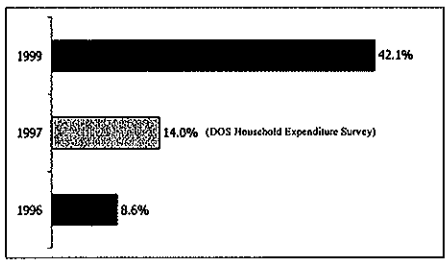
Ownership of Computers in Singapore Households



Source: IT Household Survey, IDA (1999)
(DOS: Department of Statistics)

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Internet Access in Singapore Households



Source: IT Household Survey, IDA (1999)
(DOS: Department of Statistics)

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Broadband Internet Connectivity in Singapore

- Frost and Sullivan had projected broadband subscribers to increase from
  165,000 in 2001 to 1.3m in 2006
- Numbers of broadband subscribers in 2000:-

250,000

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In Business Context...

- Intelligent use and transmission of information is key determinant of competitiveness.

IT-enhanced environment



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At Home...

- Check on elderly and children from office
- e-learning opportunities for the children
- Watch the latest movies
- Control the appliances



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Intelligent Buildings

"...buildings with sophisticated telecommunications, building management and data networking services that provide shared tenant services to their occupants."



"Intelligent Buildings in South East Asia"
Andrew Harrison, Eric Loe, and James Read

iXccess

Our Services

- Structured Cabling System
- Data Networking
- Broadband Internet Connectivity
- Fixed Wireless Solutions
- Home/Office Networking
- Community Portal Development

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Our Value Proposition

- One Stop Service Provider
  –Design, Build and Deliver
- Strong Partnerships

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Our Partners

Keppel T&T · Harmony telecommunications · Keppel Logistics · m1 · Retrust · stratech · Celbiz · Apsilon Technologies

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Our Partners

Affinity · tradeasia · Radiance Communications · asp · adroit · TRISILCOFOLEC

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Project Management Capabilities

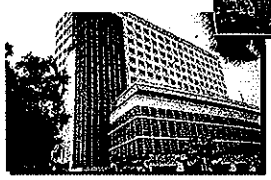
- Specialized Team
- Experienced Engineers and Consultants

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Government

The New HDB Centre (Toa Payoh)





The URA Centre

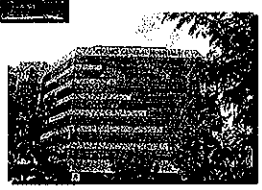
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Hospitals



New Tan Tock Seng Hospital

Changi General Hospital



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Data Centre



"Get IT done"



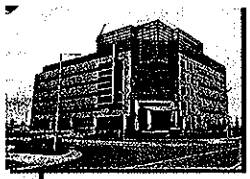


DataOne (Asia) Pte Ltd

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Commercial

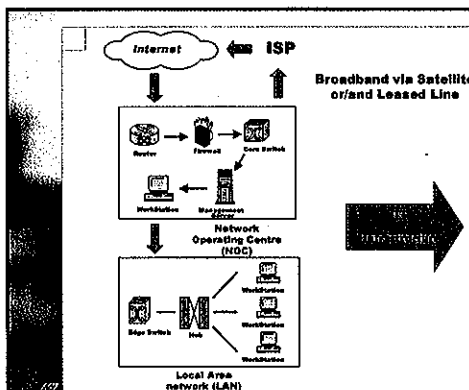
Honeywell Building



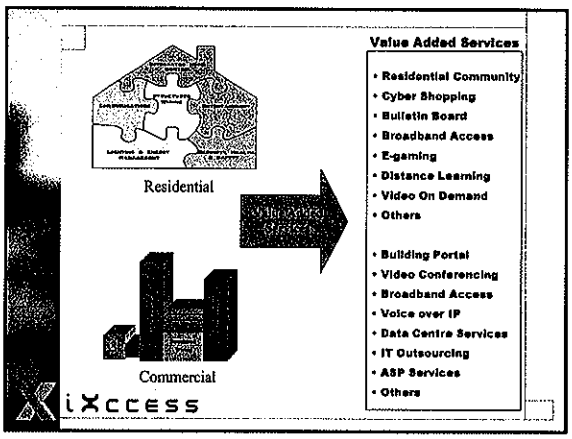


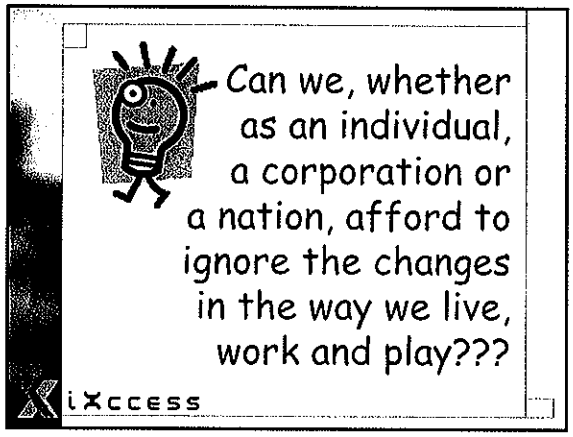
Roxy Hotel

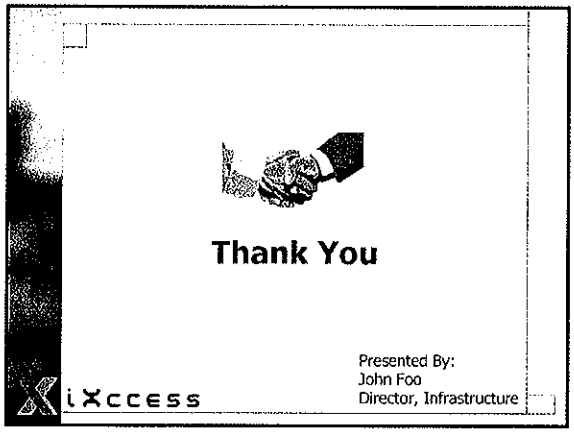
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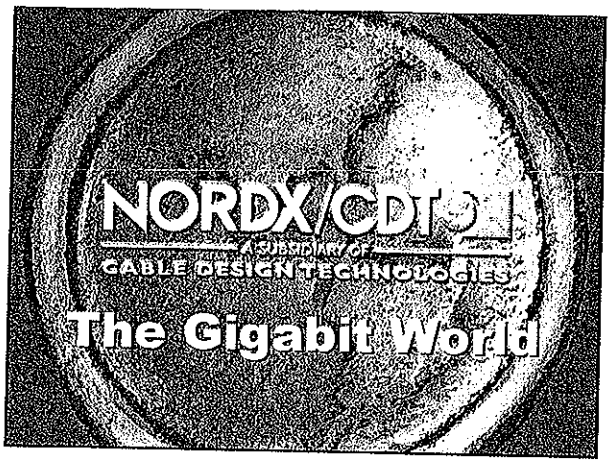


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Value Added Services
• Residential Community
• Cyber Shopping
• Bulletin Board
• Broadband Access
• E-gaming
• Distance Learning
• Video On Demand
• Others
• Building Portal
• Video Conferencing
• Broadband Access
• Voice over IP
• Data Centre Services
• IT Outsourcing
• ASP Services
• Others
Residential
Commercial
iXccess


Can we, whether as an individual, a corporation or a nation, afford to ignore the changes in the way we live, work and play???
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Thank You
Presented By:
John Foo
Director, Infrastructure
iXccess



Agenda

CDT - *The Parent Company*

NORDX/CDT - *The Flagship*

The Four Cornerstones of our Vision

NORDX/CDT

Cable Design Technologies

Fast Facts

Public Corporation (NYSE)

- HQ in Pittsburgh, Pennsylvania, USA
- Holding of 24 CDT companies around the world
- A worldwide leader of Communications & Specialty Electronic Products

NORDX/CDT

CDT Profile

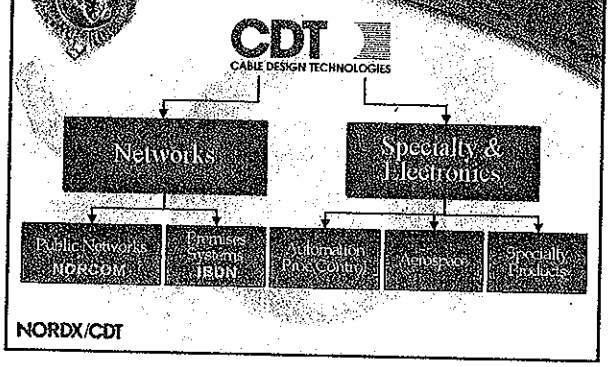
Highlights

Established in 1985

Sales:	$800M US
4 Years CAGR:	44 %
Manufacturing Facilities:	24
Employees Worldwide:	3,600
Sales Offices Worldwide:	55

NORDX/CDT

Structure



NORDX/CDT

CDT Vision

To Create *High Speed, Custom Designed* and *Value Added* Cabling Products and Systems

Paving the Way for the Internet and Digital Revolutions

NORDX/CDT

CDT Objectives

$1 Billion *US* **in revenues by 2001**

Continued Acquisitions in *Specialty* Niches & Fiber Technologies

Industry Leader in Highest Quality *Customer Service*

Premier Manufacturer of *Innovative Connective* Technology

NORDX/CDT

NORDX/CDT Profile

Highlights

HQ in Pointe-Claire, Quebec
Sales over $400M *CND*
Presence in over 35 Countries
Over 1100 Employees
More than 2000 Products
CDT R&D Center of Excellence
4 ISO 9001 Mftg. Plants Worldwide

NORDX/CDT

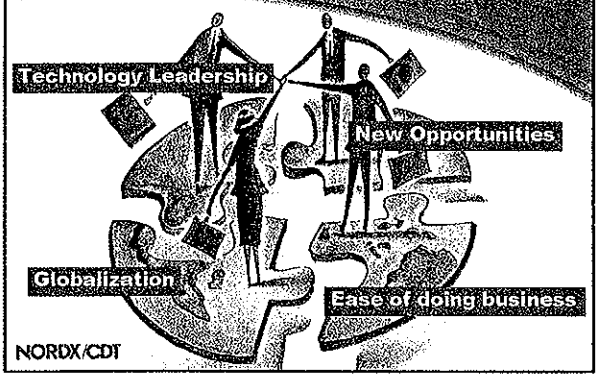
NORDX/CDT Leadership

Innovation

1986	Structured Wiring Concepts
1989	First *UTP for 16 Mb/s* Token Ring
1992	*End-to-End Cat 5 System*
1996	*52 Mb/s over 1 km* Outside Plant Broadband Cable
1998	Fiber*Express* Systems
2000	First *300 MHz 4.8 Gb/s UTP System*

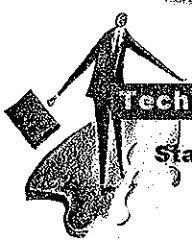
NORDX/CDT

NORDX/CDT Vision



NORDX/CDT

NORDX/CDT Vision



Technology Leadership

Standards Organizations •
Copper Physics •
Fiber Made Easy •
Solutions, not just Products •

NORDX/CDT

NORDX/CDT Vision



Globalization

Global Users •
Growth in Intl. Markets •
Acquisitions •
Capacity Increase •

NORDX/CDT

Vision

Ease of doing business

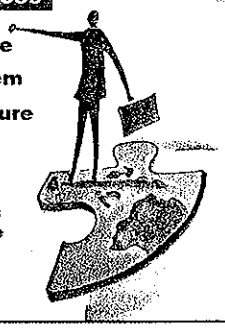
Focus: Customer Service

Cornerstone: QAD System

WEB Platform Architecture

Next Step: E-Commerce

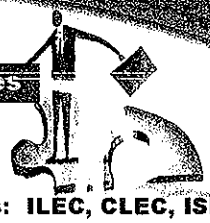
- On Line Inventory
- Order Status
- Commercial Inquiries
- Technical Assistance



NORDX/CDT

Vision

New Opportunities



More than
LANs / WANs

New Emerging Apps: ILEC, CLEC, ISP

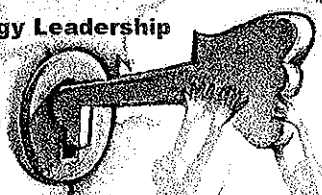
New Business Line: Broadband Networks

Creating New Business Opportunities

NORDX/CDT

Unlocking the Vision

- Technology Leadership
- Globalization
- New Opportunities
- Ease of doing business



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Marketing IBDN Solutions

- Positioning
- Differentiation
- Awareness
- Demand

Programs & Tools

ENABLERS

Communications
&Programs

Partners

Winning Proposals

NORDX/CDT

With You, Partners

Certified System Vendors

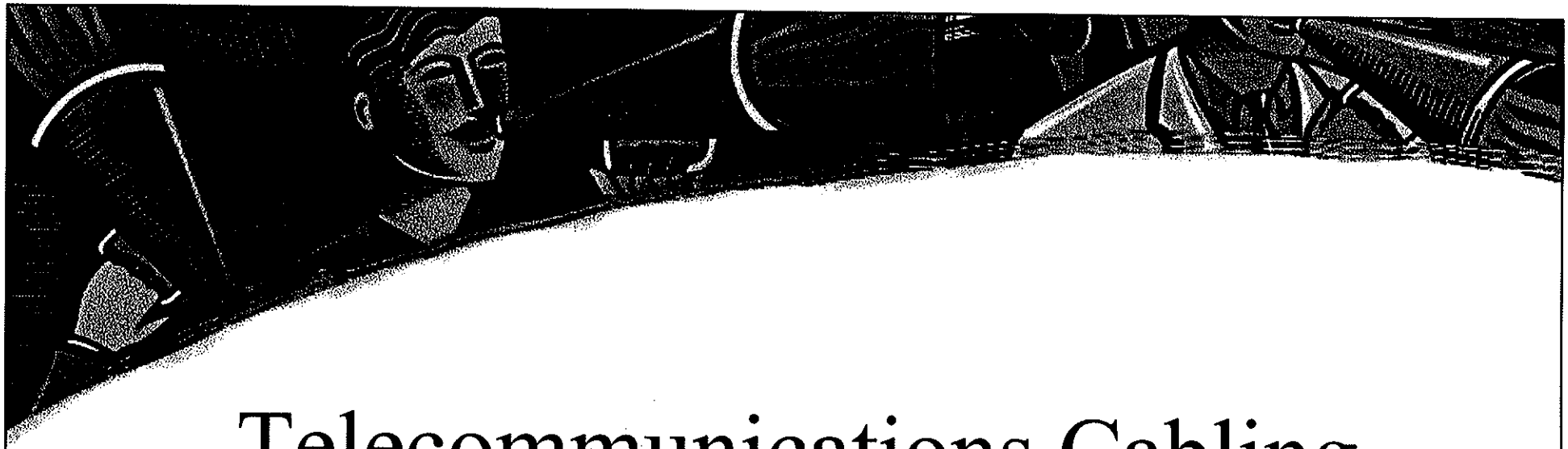
PARTNERS

Distributors

PSP Consultants

NORDX/CDT





Telecommunications Cabling Standards & Systems

Paul Kish

NORDX/CDT

Outline

- TIA Cabling standards overview
- New standards initiatives
- Optical fiber cabling standards
- Copper cabling standards
  - Category 5e
  - Category 6
- Cabling performance
- Network performance

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Telecommunications Industry Association

- A major function of TIA is the writing and maintenance of voluntary industry Standards and Specifications
- These activities are carried out by the volunteer Members of TIA Engineering Committees

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For more information ...

www.tiaonline.org
www.global.ihs.com

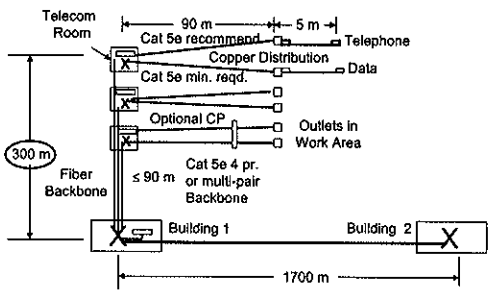
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Cabling standards include

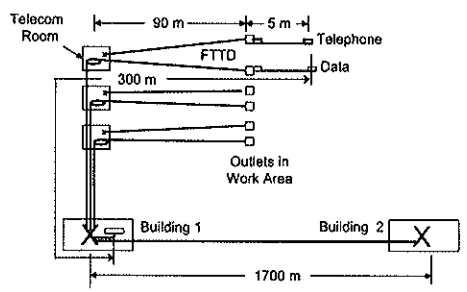
- Topology of the cabling system
- Minimum system requirements
- Component specifications
- Choice of components
- Verification of the cabling system

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Distributed Topology



Centralized Topology



Telecommunications Cabling Standards

ANSI/TIA/EIA-568-A	*A1 - A5*	*Commercial Cabling*
TIA/EIA TSB-67		*Field Testing (C5)*
TIA/EIA TSB-72		*Centralized Fiber*
TIA/EIA TSB-75		*Open Offices*
TIA/EIA TSB-95		*Field Testing (C5 +)*



ANSI/TIA/EIA 568-B

=

568-B1 Approved
Main Document

568-B2 Approved
Copper

568-B3 published
Fiber

Telecommunications Cabling Standards

TIA/EIA-569-A	*A1 - A5*	*Pathways & Spaces*
TIA/EIA-570-A		*Residential Cabling*
TIA/EIA-606 *		*Administration*
TIA/EIA-607 *		*Grounding / Bonding*
TIA/EIA-758	*A1*	*OSP Cabling*

* new revision under development

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New Initiatives

- Industrial cabling
  - new cables and connectivity
- Building Automation Systems
  - new design and topology
- Multi-tenant buildings
  - new design and topology
- Simplified administration standard
  - TIA/EIA 606-A under development

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Industrial Telecommunications Infrastructure Standard

- This standard will apply where the environment effect the cabling requirements such as:

- Temperature	- Vibration
- Humidity	- Corrosive Gases
- EMI,ESD and RFI	- Dust
- Shock	- Liquids

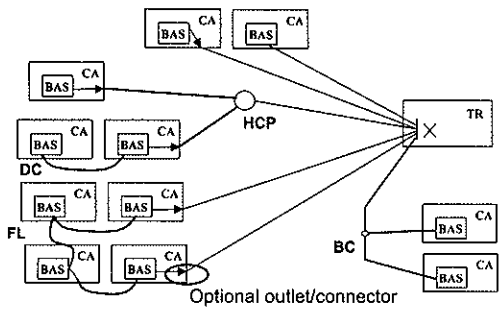
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Building Automation Cabling Standard for Commercial Buildings

- What is a BAS?
  - It is a system that centralizes and integrates:
    - monitoring
    - control
    - operation and
    - management of building(s) services (e.g. fire alarm, HVAC, Security, etc)

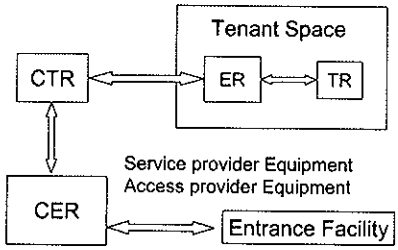
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Building Automation Cabling Modified Star Topology



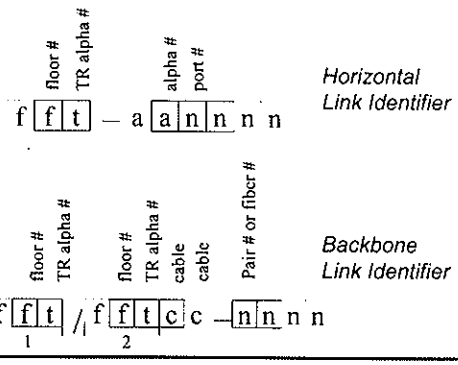
Multi-tenant Buildings

Functional Groupings



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Simplified Administration Standard



Fiber Cabling Standards Update



NORDX/CDT

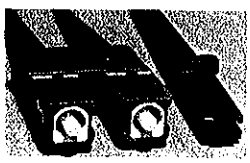
TIA/EIA 568-B.1 & B.3

- Fiber Cables
  - 50 µm fiber is recognized
  - next generation MMF is under development
    - 10 Gb/s at 300 m
- Fiber connectors
  - new SFF connectors may be considered
    - must meet TIA/EIA Intermateability standard (FOCIS)

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TIA/EIA 568-B.1 & B.3

New Connectors



5 New Connectors:
- Small Form Factors (SFF)
- RJ style with latch
- mini-duplex

Example

Comparison between SC Duplex (left) and MT-RJ connector

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Fiber Launch Characteristics

Many modes - Max. data rate 622 Mb/s

Few modes - relatively high data rate capability

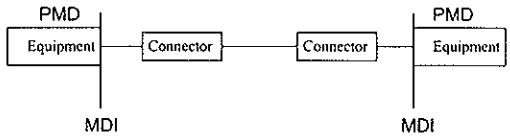
Bandwidth measurements

- Conventional Over Filled Launch (OFL) bandwidth measurements do not show centerline defects in multimode fibers
- Direct measurement of laser bandwidth is crucial for high-speed laser-based networks..

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Gigabit Ethernet over optical fiber

- Standard published July 1999
  - 1000BASE-SX (850 nm)
  - 1000BASE-LX (1310 nm)



NORDX/CDT

Worst Case 1000BASE-SX Link power budget and distance

@ 850 nm	62.5 µm MMF		50 µm MMF		Unit
• OFL Bandwidth	160	200	400	500	MHz.km
• Operating distance	220	275	500	550	m
• Link power budget	7.5	7.5	7.5	7.5	dB
• Link power penalties	4.27	4.29	4.07	3.57	dB
• Channel Ins. Loss	2.38	2.60	3.37	3.56	dB
• Unallocated margin	0.84	0.60	0.05	0.37	dB
• Channel allowance	3.22	3.20	3.42	3.93	dB

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Worst Case 1000BASE-LX Link power budget and distance

@ 1310 nm	62.5 µm MMF	50 µm MMF		SMF	Unit
• OFL Bandwidth	500	400	500	N/A	MHz.km
• Operating distance	550	550	550	5000	m
• Link power budget	7.5	7.5	7.5	8.0	dB
• Link power penalties	3.48	5.08	3.96	3.27	dB
• Channel Ins. Loss	2.35	2.35	2.35	4.57	dB
• Unallocated margin	1.67	0.07	1.19	0.16	dB
• Channel allowance	4.02	2.42	3.54	4.73	dB

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New Application Standards

- IEEE
  - 802.3ae 10 Gig Ethernet
    - four options (MMF and SMF)
  - 802.3af Remote powering of equipment
  - Ethernet in the last Mile
    - a lot of interest (ILEC and CLEC)

NORDX/CDT

The IEEE PMD Battle Is Over

- 10 Gb/s options
  1) 10GBASE-SR/SW (850 Serial on MMF)
  2) 10GBASE-LX4 (1310 WWDM on MMF & SMF)
  3) 10GBASE-LR/LW (1310 Serial on SMF)
  4) 10GBASE-ER/EW (1550 Serial on SMF)

NORDX/CDT

10 Gigabit Operating Ranges on MMF

Fiber type	Modal BW @ 850 nm / 1310 nm	Option 1 Serial Minimum range 850 nm	Option 2 WWDM Minimum range 1310 nm
62.5 µm MMF	160 / 500	2 to 28 m	2 to 300 m
	200 / 500	2 to 35 m	2 to 300 m
50 µm MMF	400 / 400	2 to 69 m	2 to 240 m
	500 / 500	2 to 85 m	2 to 300 m
	2000 * / 500 / 500	2 to 300 m	2 to 300 m

* Laser optimized

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10 Gb/s Ethernet schedule

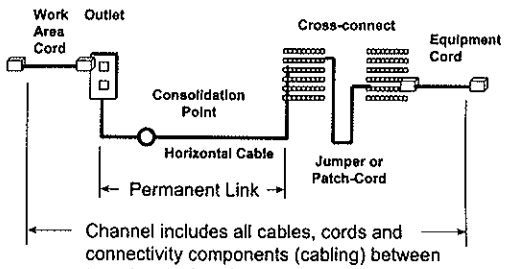
- Objectives drafted July 1999
- Task group formed March 2000
- Working group ballot March 2001
- LMSC ballot November 2001
- Standard complete May 2002

NORDX/CDT

TIA Copper Cabling Standards Update

NORDX/CDT

Cabling Components

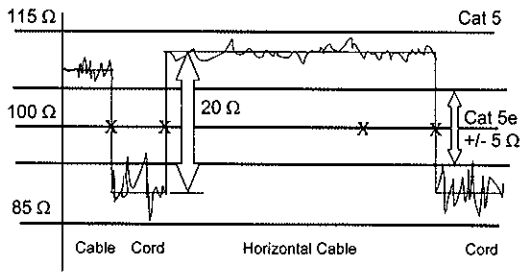


Category 5e Cabling

- Supercedes Category 5 for new data cabling installations
- Available bandwidth of 100 MHz for a worst case channel configuration with 4 connectors (PSACR > 3dB @ 100 MHz)
- Component Impedance Matching
  - Tight Return Loss specification

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Component Impedance matching



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What is Category 6 ?

- Same cabling topology as Category 5
- Available bandwidth of 200 MHz
- Parameters specified to 250 MHz
- same 8-pin modular jack interface

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Category 6 Standard Update

- What's resolved
- What's unresolved
- What's not accounted for

NORDX/CDT

Category 6

- What's resolved
  - Channel and permanent link specifications
    - Insertion Loss
      - includes allowance for ILD
    - Bandwidth (PSACR > 0 at 200 MHz)
    - PSNEXT / PSELFEXT
    - Return Loss
    - Delay Skew
  - New Annex on higher temperature

NORDX/CDT

Annex - Cable Installation in higher temperature environments

°C	°F	Length (m)	De-rating * (m)
20	68	90.0	0.0
30	86	87.0	3.0
40	104	84.0	6.0
50	122	81.0	9.0
60	140	78.0	12.0

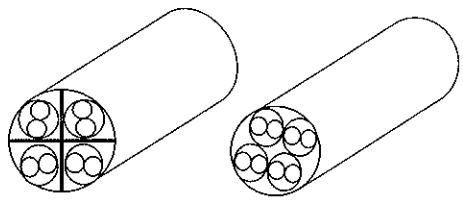
* Cable Insertion Loss of 19.8 dB/100 m at 100 MHz and 20° C

Cable Installation in higher temperature environments

	°C	°F	Length (m)	Cable IL* (dB)
Cat 6	20	68	90.0	19.8
	30	86	90.0	19.1
	40	104	90.0	18.4
Beyond Cat 6	50	122	90.0	17.6
	60	140	90.0	17.0

* Cable Insertion Loss in dB / 100 m at 100 MHz and 20 °C

Not all Category 6 cables are alike?



0.55 - 0.6 mm copper cross-web filler

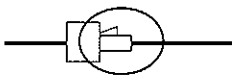
Beyond Category 6
Very stable Impedance
Low Loss - higher temp.

0.51 - .55 mm copper conventional

Category 6 compliant
Installation variance
Controlled temperature

Category 6 draft 7 ballot

- Unresolved ballot comments
  - connecting hardware specifications
    - backward compatibility & interoperability



de-embedded NEXT of plug
de-embedded FEXT of plug (TBD)

Category 6

- What's not accounted for
  - external noise

  e.g.

  Alien crosstalk
  Impulse noise

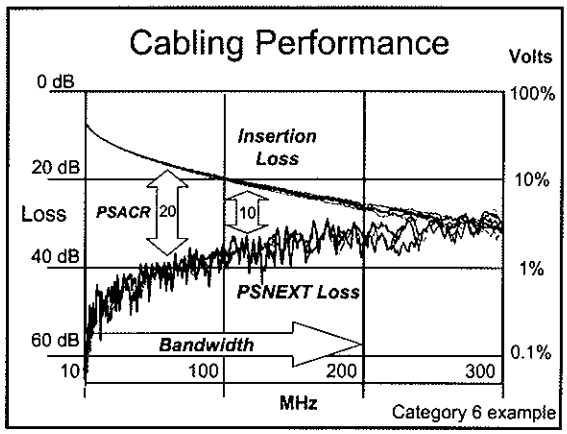
  ...

NORDX/CDT

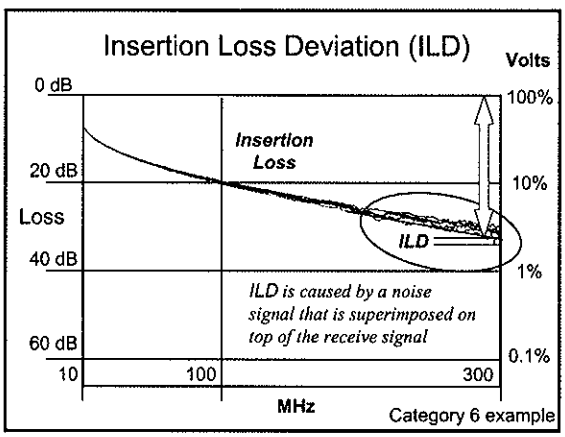
Cabling Performance

NORDX/CDT

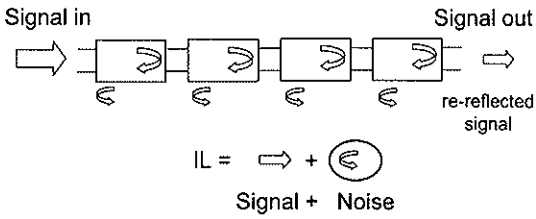
Cabling Performance



Insertion Loss Deviation (ILD)



Added noise due to component impedance mismatch

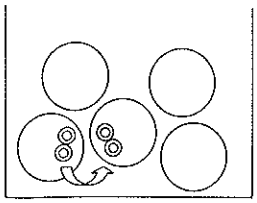


I've heard about Alien Crosstalk

What is Alien Crosstalk?
Is it important?

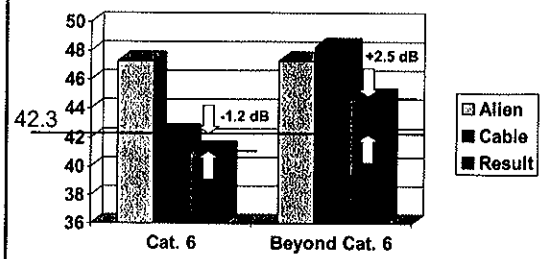
NORDX/CDT

What is Alien Crosstalk ?



NORDX/CDT

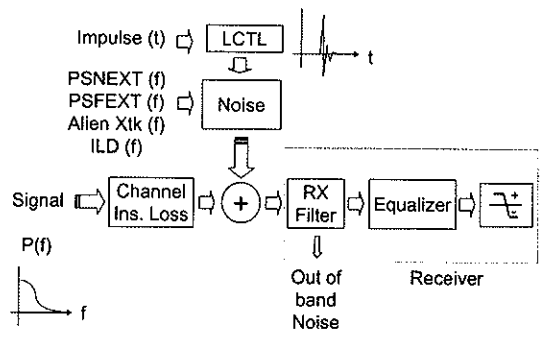
Example of Alien PSNEXT @ 100 MHz



How does cabling performance relate to network performance?

NORDX/CDT

Network Performance



Let's have some fun

Quiz

NORDX/CDT

What is the determining parameter for a channel that contributes to bit errors in digital networks?

NORDX/CDT

Answer

Signal-to-Noise Ratio

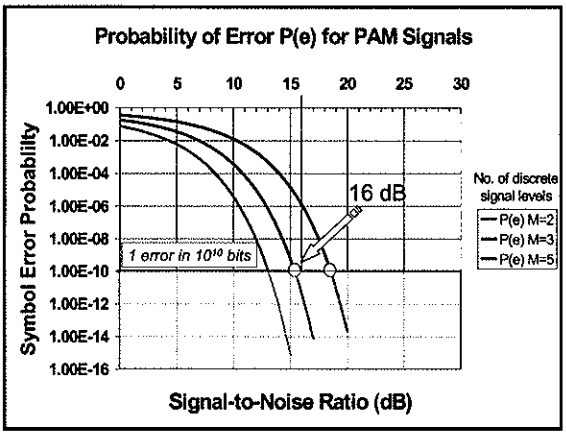
NORDX/CDT

What is the relationship between Signal-to-Noise Ratio and Bit Error Rate Performance?

NORDX/CDT

Answer

Reference: Communications Handbook, IEEE Press, Chapter 21.3



SNR due to ILD Modeling Results

	Cord - Cable mismatch	*Conn. RL @ 100 MHz*	*SNR 100BASE-TX*
Cat. 5	20 Ω	14 dB	14.2 dB
Cat. 5	15 Ω	14 dB	16.5 dB
Cat. 5e	10 Ω	20 dB	21.0 dB
Cat. 6	6 Ω	24 dB	25.5 dB

NORDX/CDT

Data Throughput

- Data throughput is significantly affected by bit errors because of packet retransmissions

% retransmissions	Throughput
0 %	100 Mb/s
1 %	20 Mb/s
2 %	4 Mb/s

Source: Wesley Irish-Xperc

NORDX/CDT

What is the relationship between Bandwidth in (MHz) and the maximum Data Rate in (Mb/s) ?

NORDX/CDT

Answer

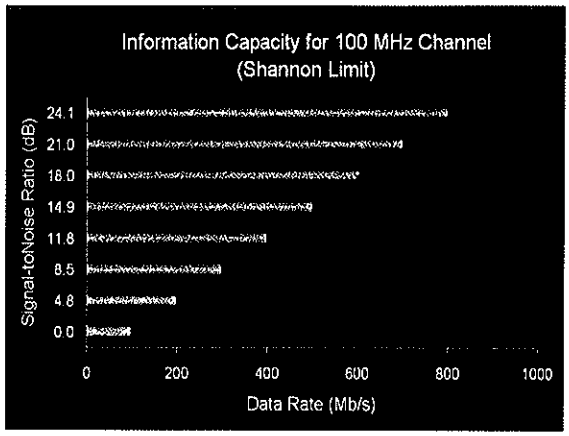
Information capacity (C)

$C = W \bullet \log_2 (1 + S/N)$ bits/s *

- Available bandwidth (W)
- *Signal-to-noise ratio* (S/N)
- Optimum line code

* Shannon's law

NORDX/CDT



Network Performance Summary

- Network performance is affected by
  - Available bandwidth
  - Signal-to-Noise Ratio
- Not all cabling systems are created equal
  - cable and connector design
  - component impedance matching
    - BER and data throughput

NORDX/CDT

Questions

IBDN Gigabit Systems Solutions

NORDX/CDT

- **Agenda**
  - The Evolution of Standards
  - What Did We Learn?
  - System 1200 Performance
  - Systems 2400 & 4800LX Performance
  - Introducing *GigaBIX*

NORDX/CDT

- **Standards**
  - Pre-publication: New Performance Targets
  - Post-publication: Absolute Minimums
  - Change and evolve over time

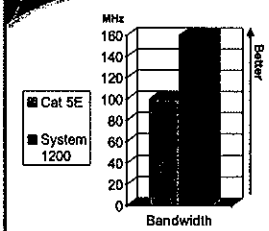
NORDX/CDT

- **Cabling Systems must be engineered beyond Standards**
  - Standards define minimum acceptable performance levels
  - Performance margins beyond standards
    - provide superior performance and quality
    - allow for Standards and Technology evolution while maintaining compliance
    - protect against obsolescence
    - protect investment

NORDX/CDT

- **The Key Criteria**
  - Bandwidth
  - Data Rate
  - Insertion Loss
  - Return Loss
  - PSACR
  - PSNEXT
  - Delay Skew

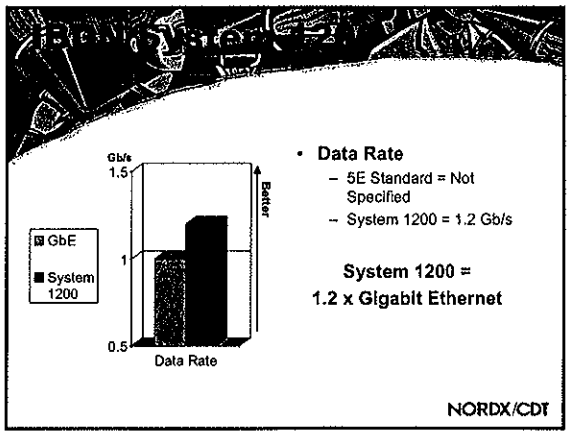
NORDX/CDT

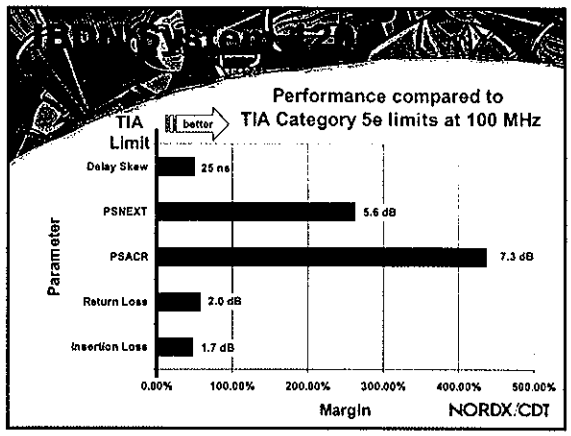


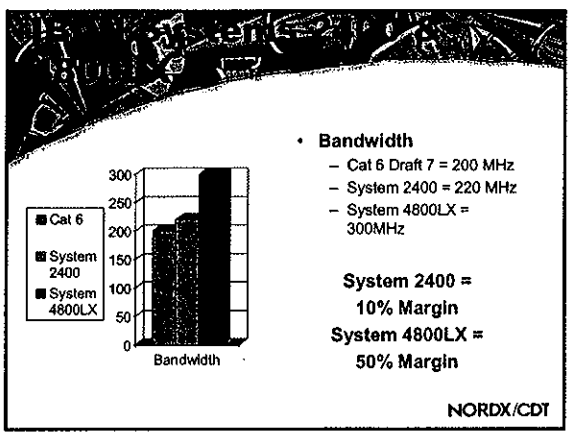
- **Bandwidth**
  - 5E Standard = 100MHz
  - System 1200 = 160MHz

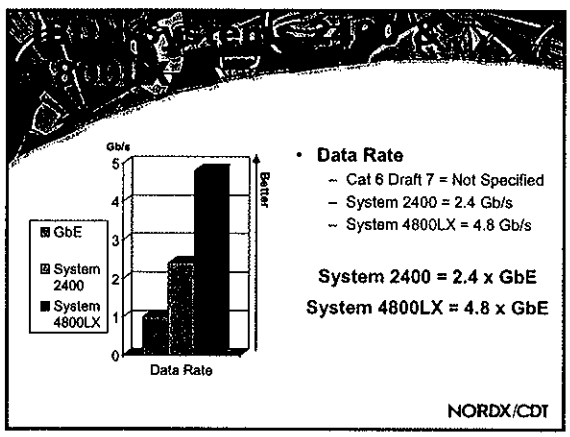
System 1200 = 60% Margin

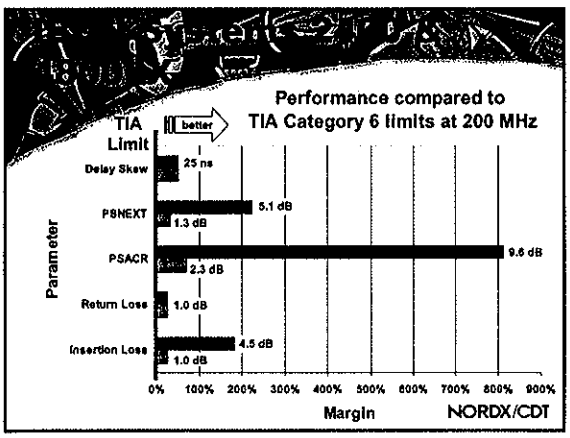
NORDX/CDT

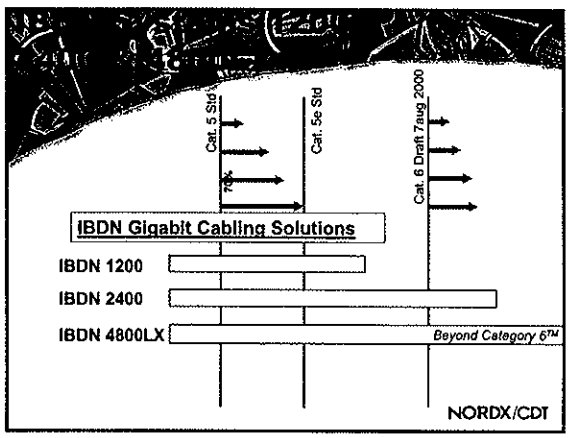

Gb/s
1.5
1
0.5
Better
GbE
System 1200
Data Rate
• Data Rate
– 5E Standard = Not Specified
– System 1200 = 1.2 Gb/s
System 1200 =
1.2 x Gigabit Ethernet
NORDX/CDT


Performance compared to
TIA Category 5e limits at 100 MHz
TIA Limit
better
Parameter
Delay Skew
25 ns
PSNEXT
5.6 dB
PSACR
7.3 dB
Return Loss
2.0 dB
Insertion Loss
1.7 dB
0.00%
100.00%
200.00%
300.00%
400.00%
500.00%
Margin
NORDX/CDT


300
250
200
150
100
50
0
Cat 6
System 2400
System 4800LX
Bandwidth
• Bandwidth
– Cat 6 Draft 7 = 200 MHz
– System 2400 = 220 MHz
– System 4800LX = 300MHz
System 2400 =
10% Margin
System 4800LX =
50% Margin
NORDX/CDT


Gb/s
5
4
3
2
1
0
Better
GbE
System 2400
System 4800LX
Data Rate
• Data Rate
– Cat 6 Draft 7 = Not Specified
– System 2400 = 2.4 Gb/s
– System 4800LX = 4.8 Gb/s
System 2400 = 2.4 x GbE
System 4800LX = 4.8 x GbE
NORDX/CDT


Performance compared to
TIA Category 6 limits at 200 MHz
TIA Limit
better
Parameter
Delay Skew
25 ns
PSNEXT
5.1 dB
1.3 dB
PSACR
9.6 dB
2.3 dB
Return Loss
1.0 dB
Insertion Loss
4.5 dB
1.0 dB
0%
100%
200%
300%
400%
500%
600%
700%
800%
900%
Margin
NORDX/CDT


Cat. 5 Std
Cat. 5e Std
Cat. 6 Draft 7aug 2000
IBDN Gigabit Cabling Solutions
IBDN 1200
IBDN 2400
IBDN 4800LX
Beyond Category 6™
NORDX/CDT

- **Performance Specifications Beyond Category 6**
  - Built in margins to:
    - Overcome 'high temperature' length de-rating
    - Maximize SNR for superior BER performance
    - Overcome impedance mismatch issues
    - Accommodate new connecting hardware specs
    - Deal with other external noise factors
      - Alien Cross-talk
      - Impulse Noise
      - ....

NORDX/CDT

GigaBIX

NORDX CDT

High Performance Cross-Connect System

Late 1970's

- **BIX** Cross-Connect System for voice
- Defacto standard

Early 1990's

- **BIX** Cross-Connect System exceeds Category 5 performance

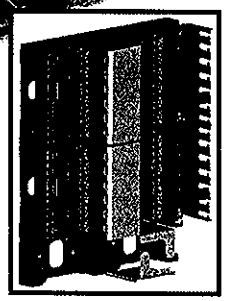
2001

- ***GigaBix*** Cross-Connect System goes **Beyond Cat 6™**

NORDX/CDT

- **Contact Reliability**
- **Termination Density**
- **Ease of Administration**
- **Standardization - one type of connection**
- **Reduced material and labour costs**

NORDX/CDT



- **Guaranteed Bandwidth to 300 MHz**
- **Data Rates to 4.8 Gb/s**
- **High Density**
- **Easy-to-install modular design**
- **Simplified planning and ordering**
- **New cord management accessories**
- **Great high-tech look**

NORDX/CDT

- **Faster, Better Installation Procedures**
  - Cable jacket right to connection point means faster termination
  - Colour coding on pair splitters
  - Wire Guards to secure terminated pairs
  - Connectors polarized into *GigaBIX* Mount
  - Similar to BIX procedures

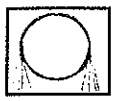
NORDX/CDT

- **New, Easy-to-Order Termination Kits**
  - Simplifies planning and ordering
  - Components may be purchased individually for replacement
- **High-Tech Look**
  - Connector: Clear Graphite with white center
  - Mount: Black base with clear graphite fanning strips
  - Management Accessories: Black
  - Cover on Patch Cord Organizer

NORDX/CDT



- Termination Kits
  - 72 Port & 300 Pair
    - Mount
    - 12 Connectors
    - Wire Guards
    - Designation Strip
    - Velcro Ties
    - Labels

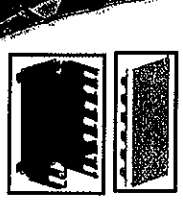


- *GigaBIX* XC Wire



- Management Ring

NORDX/CDT



- Cable Management Module



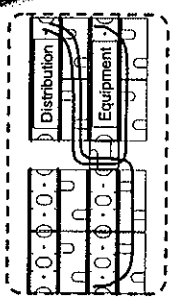
- Patch Cord Organizer & Cover



- Horizontal Channel Plate
- *GigaBIX* Patch Cords

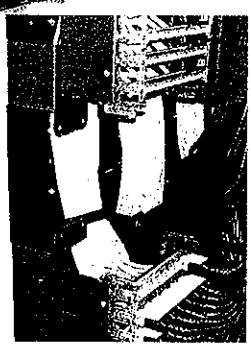


NORDX/CDT

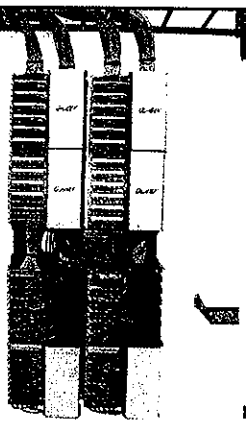


- 288 x 288-port XC modules
- Scalable up to 4608 ports
- Plug-and-Go management

NORDX/CDT

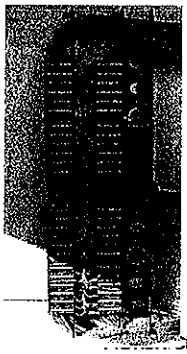


NORDX/CDT

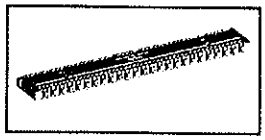


NORDX/CDT

- Highest termination density
- No slack management required
- Long term installation aesthetics
- Most cost effective solution

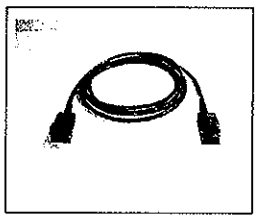


- Highest density high perf. connector available
- 2 Types
  - 6-port (4-pair cables)
  - 25-pair
- Double sided clips
- Colour coding on pair splitters & port separator marks
- Polarizing key



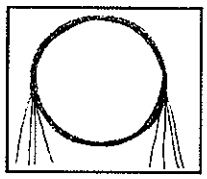
NORDX/CDT

- Certified performance to 300 MHz
- Latching System to secure connection
- Multiple lengths for design flexibility
  - 4, 6, 8, 10, 15, & 25-ft.
- Available in BIX-BIX and BIX-8mod (T568A & T568B)



NORDX/CDT

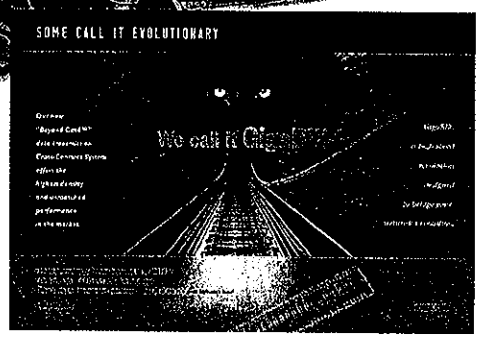
- Certified performance to 300MHz
- FEP for max performance & fire rating
- Tightly stranded pairs for max stability
- Available in 1000' spools



NORDX/CDT

- ✓IBDN Certified bandwidth to 300MHz
- ✓Best performance vs. density
- ✓Best price vs. performance
- ✓New & improved feature set
- ✓Faster, easier installations
- ✓Simplified ordering & planning
- ✓IBDN BIX reputation, recognition and reliability

NORDX/CDT



NORDX/CDT


Available
NOW!
NORDX/CDT

*The **Fast** and **Easy** Approach to Fiber Networking*

by
Paul Kish
NORDX/CDT

NORDX/CDT

Why Fiber?

- Pros
  - Longer distances up to 300 m
  - Immunity to EMI, RFI and noise
  - Security
- Cons
  - Cost of electronics / complexity
  - Compatibility with legacy equipment



NORDX/CDT

Which Fiber?

- Multimode fiber
  - **compatibility with LED systems and FDDI**
    - **50 / 125 µm MMF up to 600 m for GbE**
    - **62.5 / 125 µm MMF up to 300 m for GbE**
- Single-mode fiber
  - **longest reach / highest bandwidth for laser based systems**

NORDX/CDT

Optical Fiber Cabling

- LAN
- CLEC / ILEC
  - co-locate central office
  - customer premises
- ISP / IDC
  - server farms

NORDX/CDT

- Universal solution
- End-to-end system

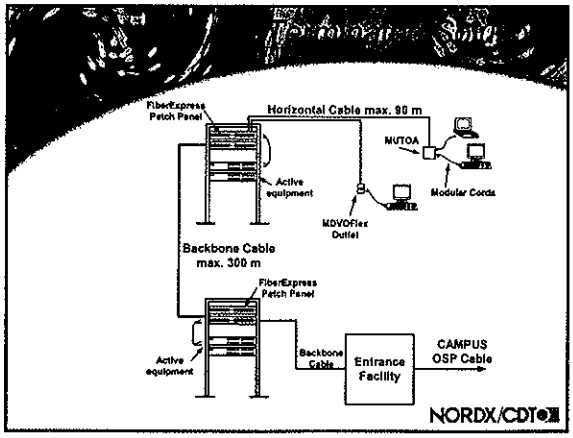
"Express" as in:

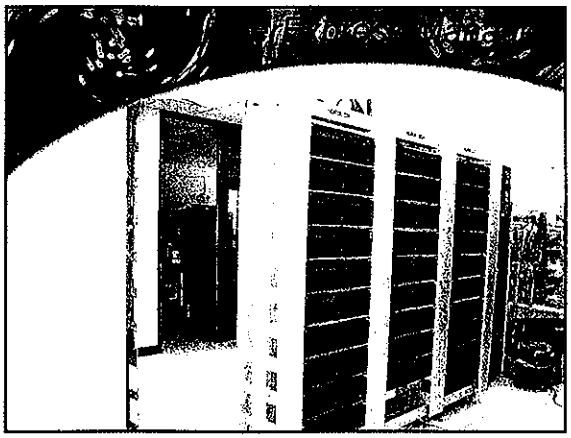
- Fast, easy and reliable
  - saves time
  - saves space
  - no special skills required

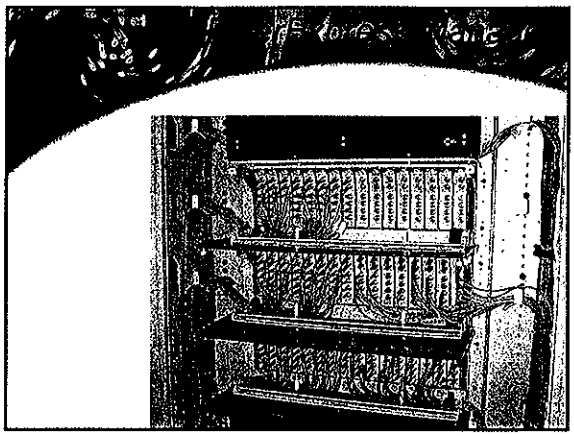
NORDX/CDT

- *Field-Terminated Solution*
- *Pre-Terminated Solution*

NORDX/CDT



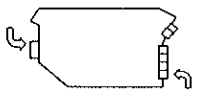




Connector Module

- 6 /12 fibers per module
- Pre-loaded with adapters
- Field
- Protects fibers & connectors
- Easy access to connectors
- Bend radius control
- Fiber Slack management
- Room for splice holder

Optional 12-fiber MTP ribbon connector



6 SC, ST or MT-RJ duplex connectors

NORDX/CDT

Racks

- 19" or 23" by 7' high
- Capacity: 10 shelves
  - up to 1920 fibers
- 6 " wide vertical cable trough
  - to store patch cord slack
  - maintains bend radius
  - hinged door
- Horizontal trough
  - to run patch cords from side to side

NORDX/CDT

- Max. Distances at 1 Gb/s

	Core dia.	850nm	1300nm
*FX*300	62.5 µm	300 m	550 m
*FX*600	50 µm	600 m	600 m

Breakout, Distribution, Interconnect, Loose tube, Indoor/outdoor, Armored, Composite, Ribbon

NORDX/CDT

Pre-polished fiber stub & mechanical splice
no epoxy
no curing, no mixing
no polishing
very fast installation
no consumables: saves
easy to learn
just a few basic tools
ceramic (zirconia) ferrule

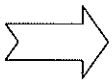


NORDX/CDT

- *Top Quality*
  - using ceramic ferrules only
  - PC & SPC polish
  - Qualified against TIA & Telcordia Standards
  - 100% verified performance

NORDX/CDT

- time
- space
- security
- bandwidth



Innovative solutions from NORDX/CDT

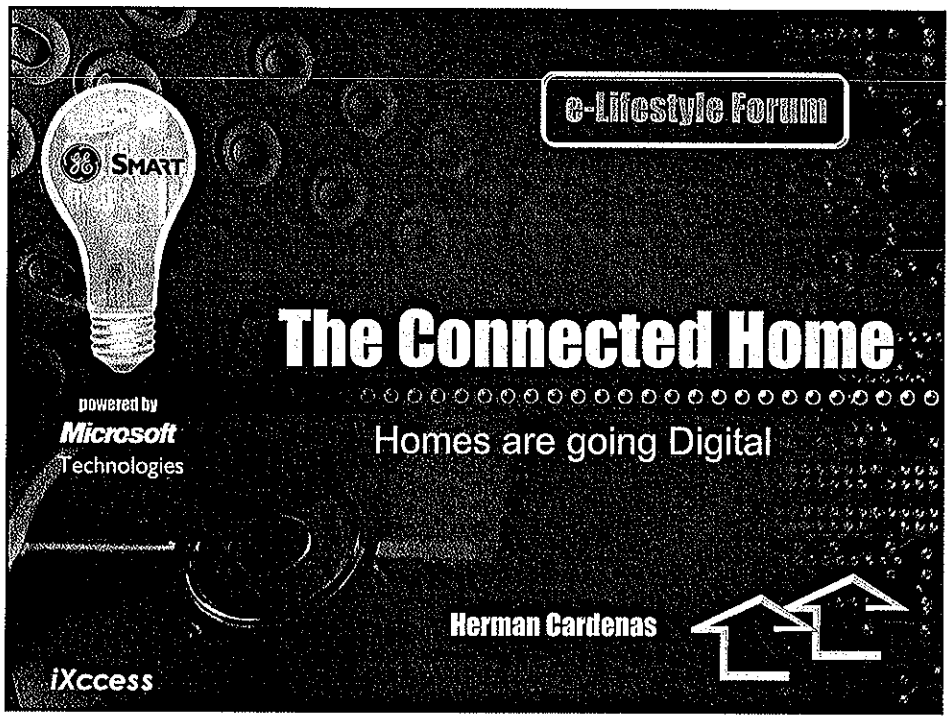
NORDX/CDT

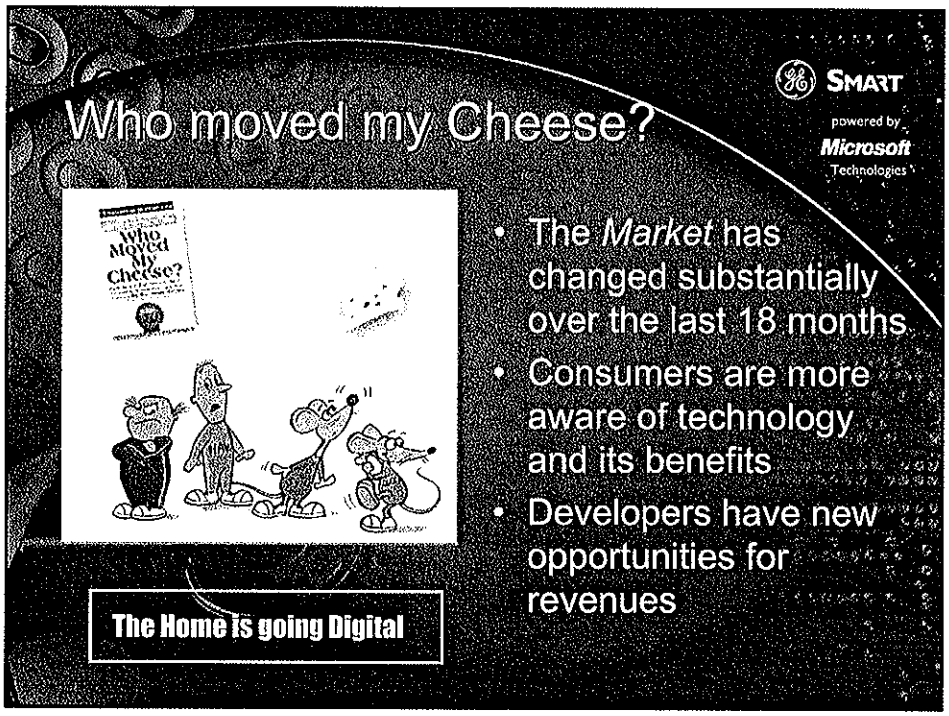
- exceeds TIA and Telcordia standards
- efficient / high density cable management
- fast and reliable installation
- aesthetic and ergonomic design
- IBDN certification

NORDX/CDT

Questions

NORDX/CDT


e-Lifestyle Forum
SMART
The Connected Home
powered by
Microsoft
Technologies
Homes are going Digital
Herman Cardenas
iXccess


Who moved my Cheese?
SMART
powered by
Microsoft
Technologies
Who Moved My Cheese?
• The *Market* has changed substantially over the last 18 months
• Consumers are more aware of technology and its benefits
• Developers have new opportunities for revenues
The Home is going Digital

Agenda

GE SMART powered by Microsoft Technologies

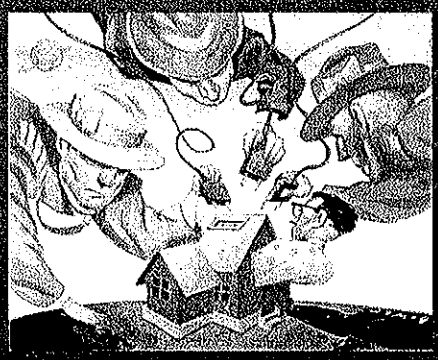
- Understanding the Connected Home
- Yesterday's Systems and Products
- Today's Systems and Products
- Tomorrow's Systems and Products
- The need for '*Digital Plumbing*' in the Home
- Connected Home Products/Scenarios
- Connected Communities
- Opportunities for Developers

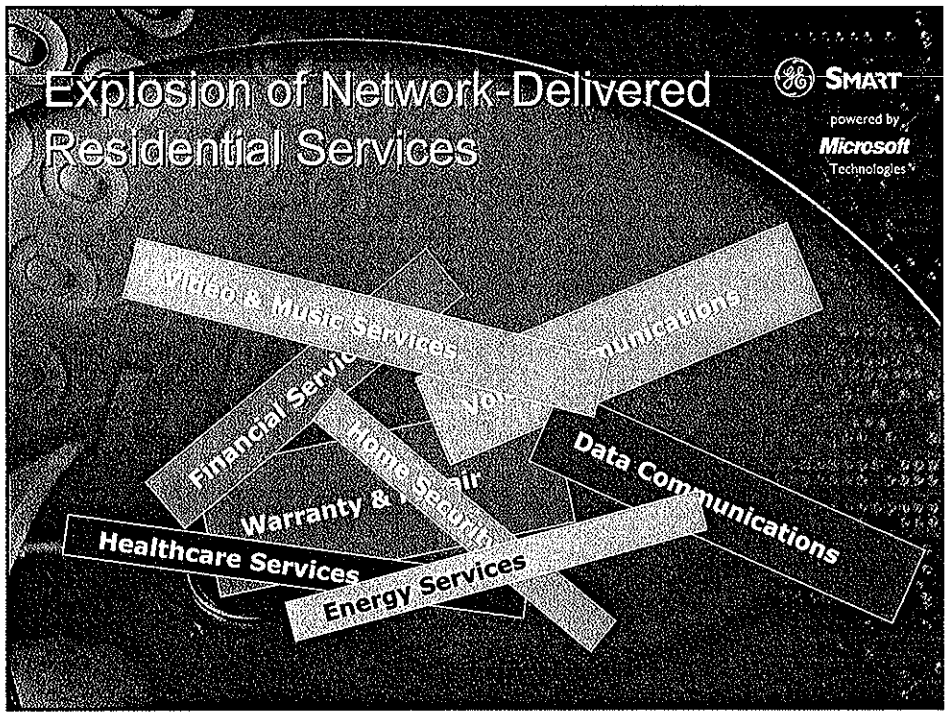


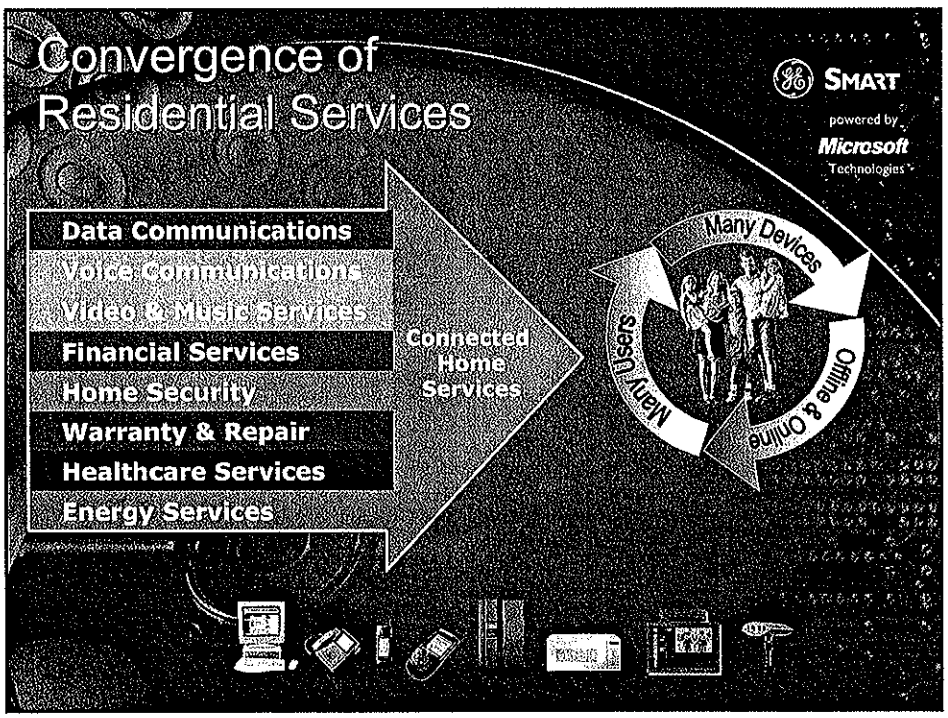
What is a Connected Home?

GE SMART powered by Microsoft Technologies

- A *Connected Home* is a home that contains the infrastructure to offer interoperability and connectivity between systems, products, and services.
  - Systems
    - Home Theater
    - Security
    - Lighting
    - HVAC
  - Products
    - Motorized:
      - » windows
      - » skylights
      - » blinds, drapes
    - Fireplaces
    - Garage Door
    - Electronic Locks
    - Pet Feeders



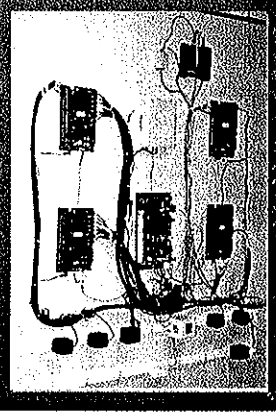

Explosion of Network-Delivered Residential Services
SMART
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Video & Music Services
Financial Services
Home Security
Warranty & Repair
Data Communications
Healthcare Services
Energy Services


Convergence of Residential Services
SMART
powered by
Microsoft
Technologies
Data Communications
Voice Communications
Video & Music Services
Financial Services
Home Security
Warranty & Repair
Healthcare Services
Energy Services
Connected Home Services
Many Devices
Online & Offline
Many Users

Recent Past (no standards).....

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- Non-Structured data infrastructure
  - (1) telephone cable (two pair) daisy chained
  - (1) RG-59 cables – daisy chained
  - (0) No cabling for computers
- Un-integrated Home Automation
- Isolated clusters of products and systems; integrated through complicated installations
- Little to no service and support

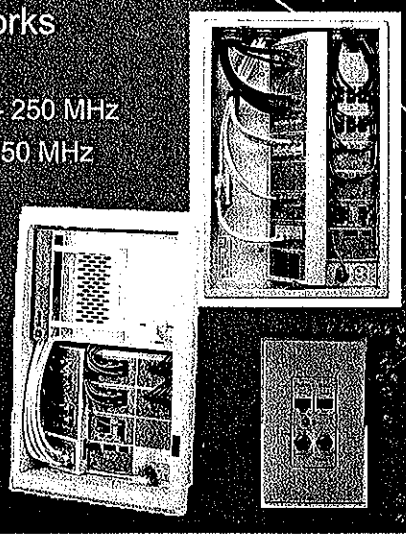


Today's Data Infrastructure in the Home

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- Structured Wiring Networks
  - RG-6 (CATV, other)
  - Category 5e (Telephone) – 250 MHz
  - Category 5e (Ethernet) – 250 MHz
- No-New-Wire Networks
  - powerline
  - telephone lines
  - coax (cable)
- Wireless Networks (RF)

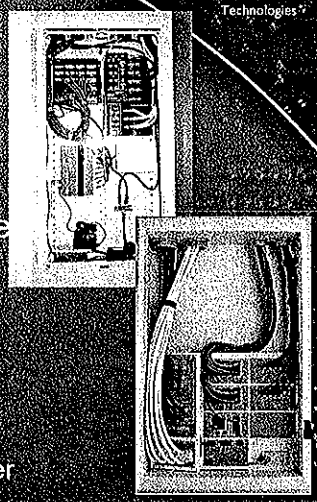
Digital Plumbing



Choose a structured wiring system.

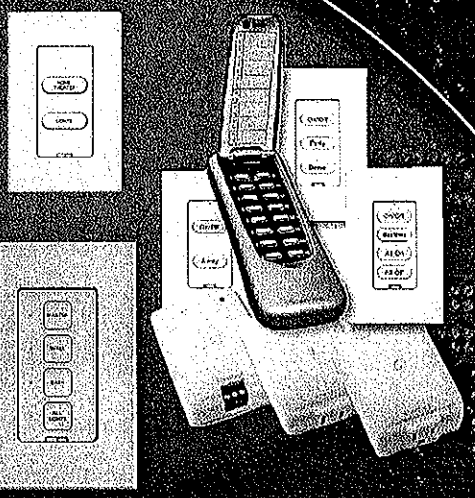


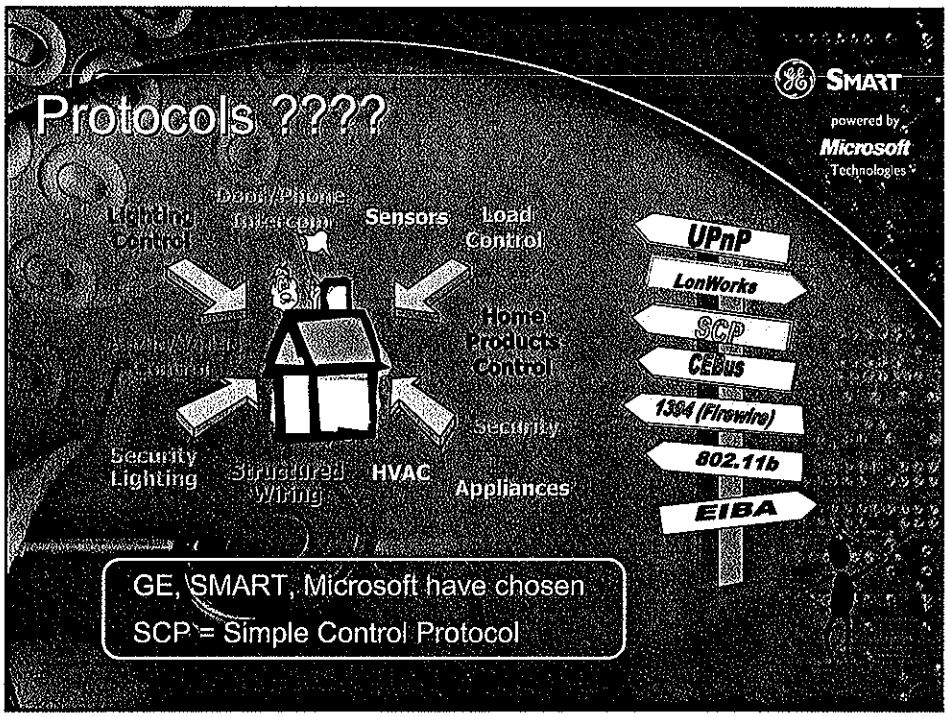
- Structured wiring systems comes in all shapes and sizes.
- ***Not all systems are created equal.
- Consider cost of:
  - Installation
  - Maintenance
  - Upgrading
- Consider Bandwidth
- Make sure your installer tests the wiring

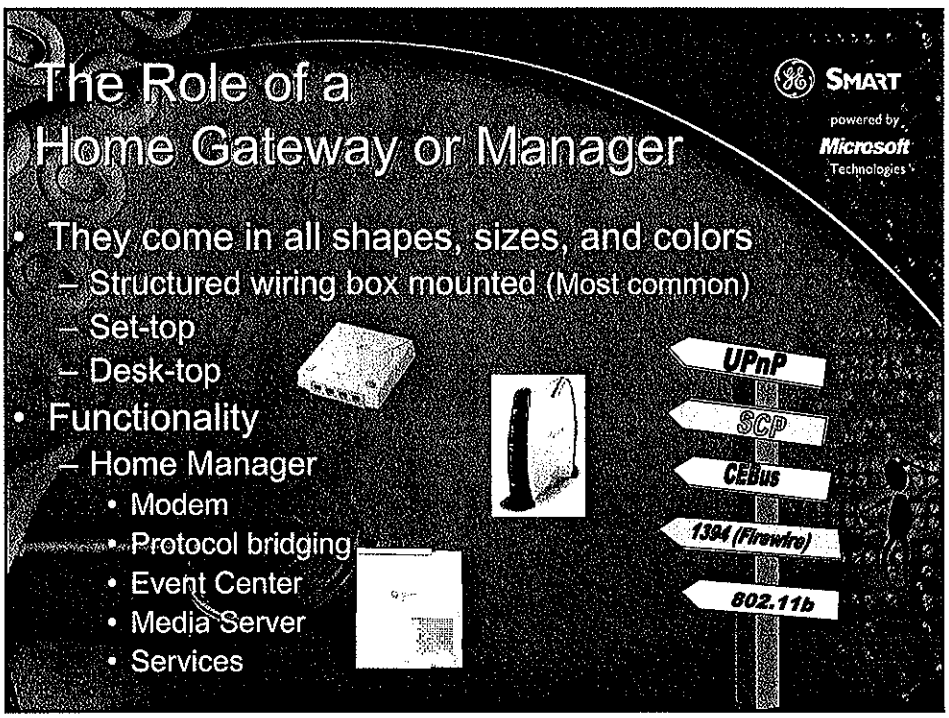


Integrated Home Control

- Control
  - Standards:
    - CEBus >> SCP
    - UPnP
  - Mediums:
    - Powerline
    - RF
    - Low Voltage wiring



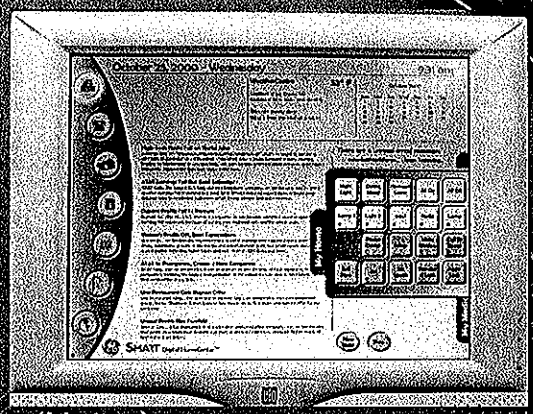

Protocols ????
SMART
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Lighting Control
Door/Phone Intercom
Sensors
Load Control
Home Products Control
Security
Security Lighting
Structured Wiring
HVAC
Appliances
UPnP
LonWorks
SCP
CEBus
1394 (Firewire)
802.11b
EIBA
GE, SMART, Microsoft have chosen
SCP = Simple Control Protocol


The Role of a
Home Gateway or Manager
SMART
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Technologies
• They come in all shapes, sizes, and colors
– Structured wiring box mounted (Most common)
– Set-top
– Desk-top
• Functionality
– Home Manager
• Modem
• Protocol bridging
• Event Center
• Media Server
• Services
UPnP
SCP
CEBus
1394 (Firewire)
802.11b

User Interface Applications

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- Multiple User (Family) User Interface
- Control
  - Devices
  - Scenes
  - Scheduling
- E-mail
- Calendar
- Contacts
- News
- Family Messaging (Notes)
- Digital Audio Play



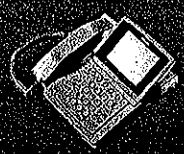
Display Devices

SMART powered by Microsoft Technologies

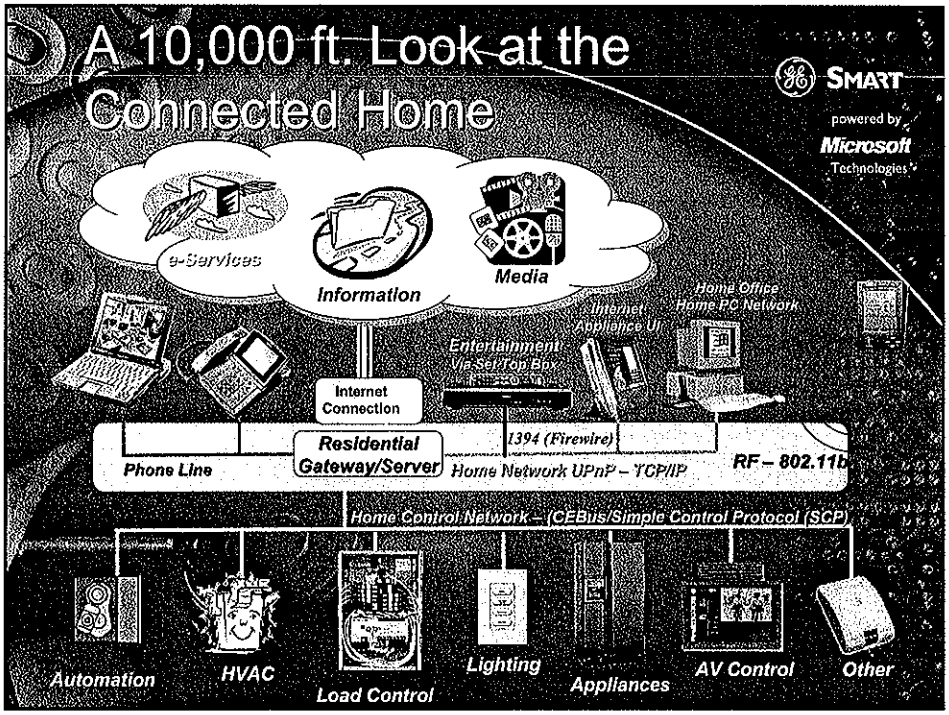
- Web Tablets
- Counter top Appliance
- Wall Mount User Interface
- Under Cabinet Appliance
- 2 Gang Retrofit Model
- Pocket PC Mobile Device

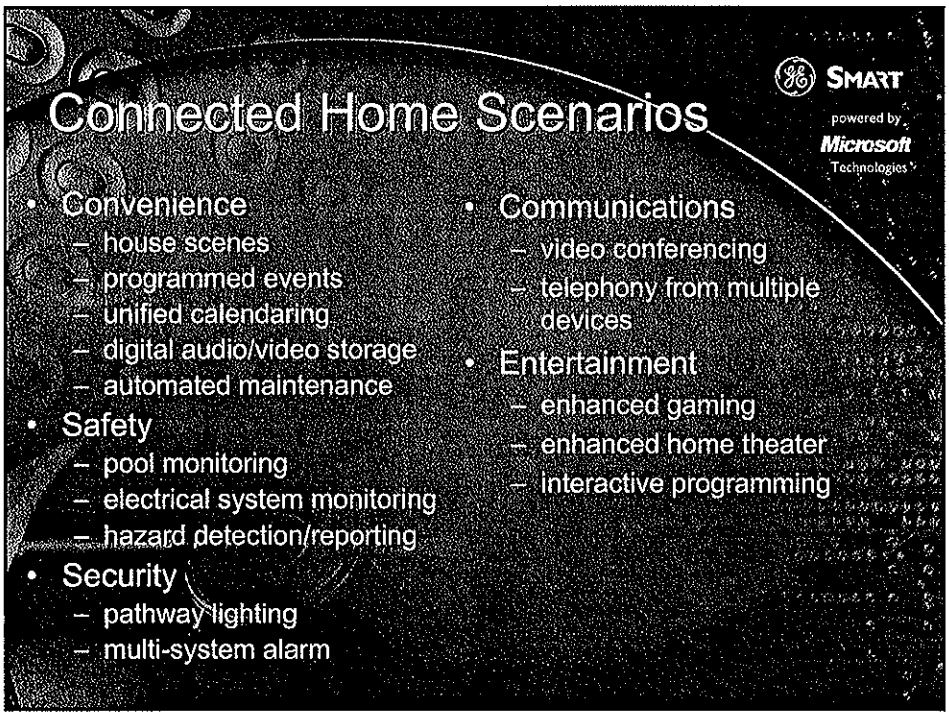









A 10,000 ft. Look at the Connected Home
SMART
powered by Microsoft Technologies
e-Services
Information
Media
Home Office
Home PC Network
Internet Appliance UI
Entertainment
Internet Connection
Residential Gateway/Server
1394 (Firewire)
Phone Line
Home Network UPnP – TCP/IP
RF – 802.11b
Home Control Network – CEBus/Simple Control Protocol (SCP)
Automation
HVAC
Load Control
Lighting
Appliances
AV Control
Other


SMART
powered by Microsoft Technologies
Connected Home Scenarios
• Convenience
– house scenes
– programmed events
– unified calendaring
– digital audio/video storage
– automated maintenance
• Safety
– pool monitoring
– electrical system monitoring
– hazard detection/reporting
• Security
– pathway lighting
– multi-system alarm
• Communications
– video conferencing
– telephony from multiple devices
• Entertainment
– enhanced gaming
– enhanced home theater
– interactive programming

Who will install and service Connected Home products?

GE SMART powered by Microsoft Technologies

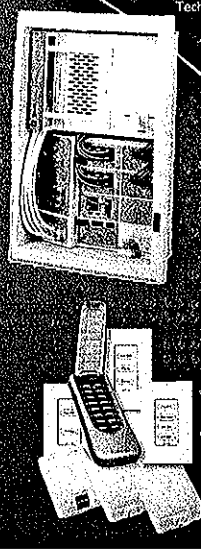
- 15,000 System Integrators
  - Home Automation installers
  - CEDIA installers
- 500,000 Electricians & Security Installers
- Home Centers
  - Best Buy, Home Depot, Sears
- GE Appliance Service
  - 24/7 customer support
  - truck rolls when necessary



GE SMART Builder Packages

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Package	Product Offering
Bronze Equivalent	Standard Enclosure with door, Basic Phone, Passive Video, No DC Power Supply
Silver Equivalent	Standard Enclosure with door, Basic Phone, Amplified Video, DC Power Supply
Gold Equivalent	Standard Enclosure with door, Enhanced Phone, Amplified Video, Home Networking, DC Power Supply
Platinum Equivalent	Standard Enclosure with door, Enhanced Phone, Amplified Video, Home Networking, Home Server, DC Power Supply
Retrofit Market	GE-SMART Structured Wiring Products retrofitted into competitive structured wiring enclosures.



Future.....

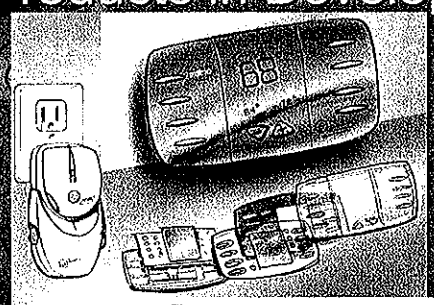
SMART powered by Microsoft Technologies

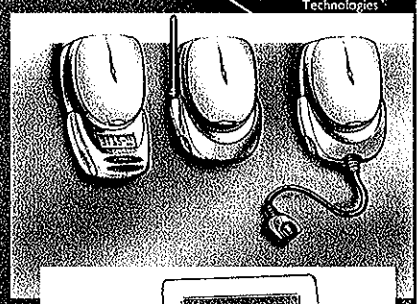
- Entertainment/Service based Systems
  - Data Centers comprised of structured wiring, residential gateways/servers, bridges, media servers
  - Media Servers
    - Digital Audio and Video (MP3, WMA, WMV,)
  - Combination of wireless/wired networks and products
- Simplified Systems
  - Simpler to install products
  - Automatic Configuration
  - Loosely bound products and networks

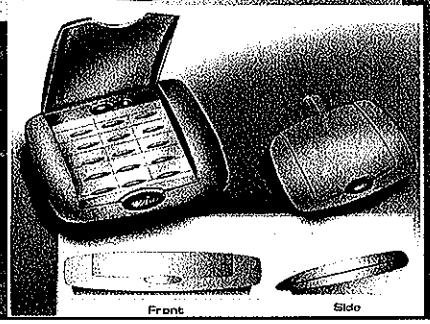


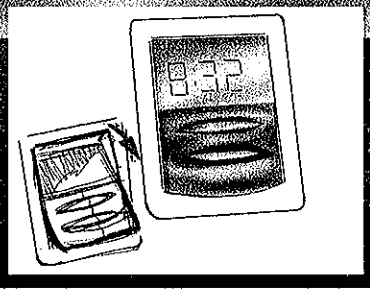
Products in Development

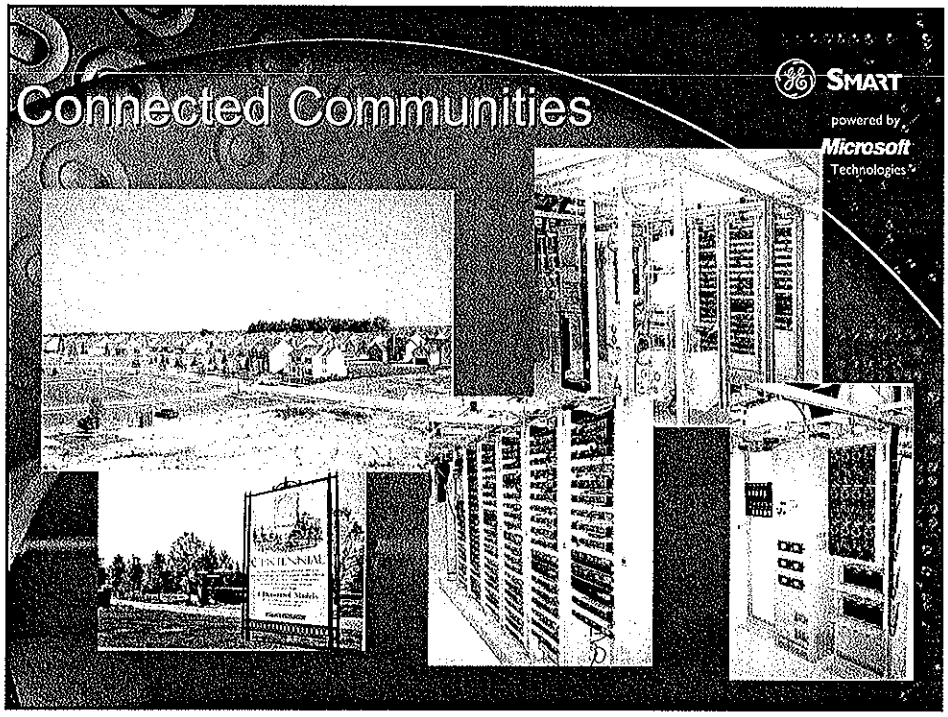
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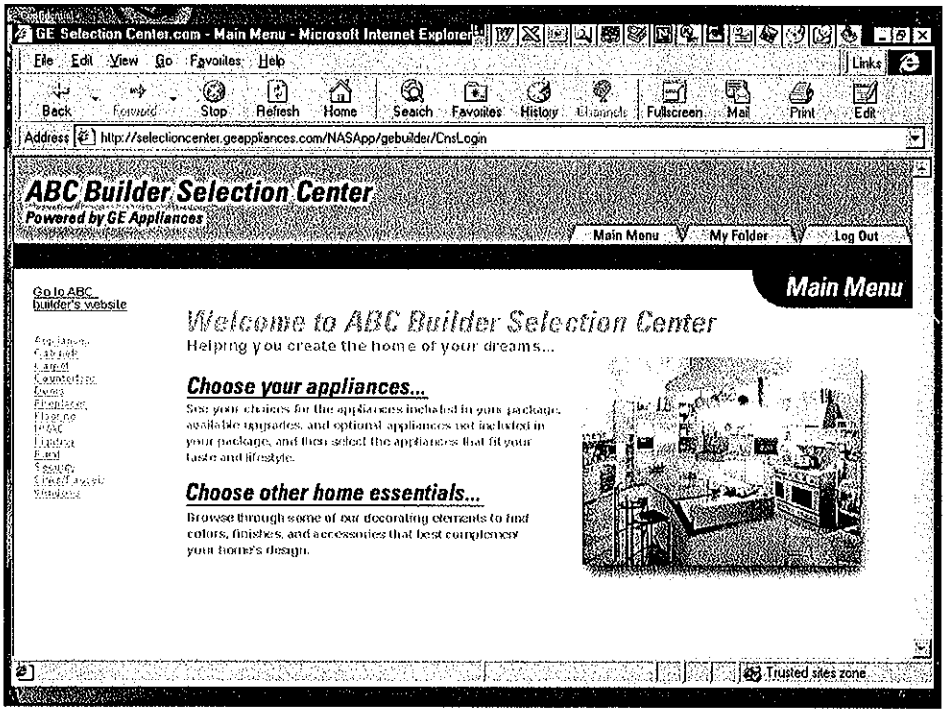


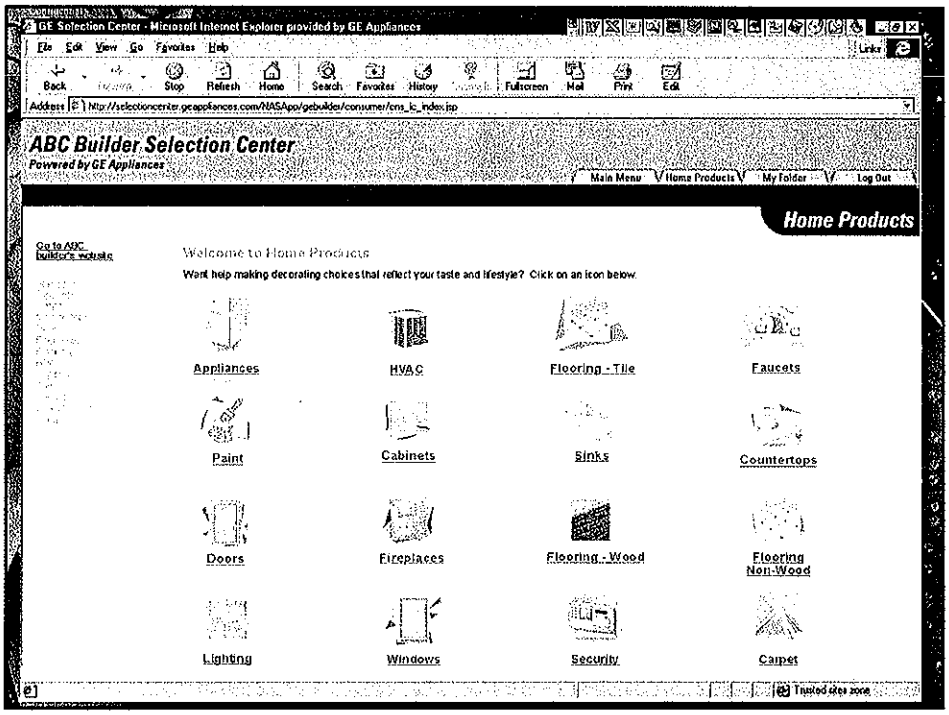


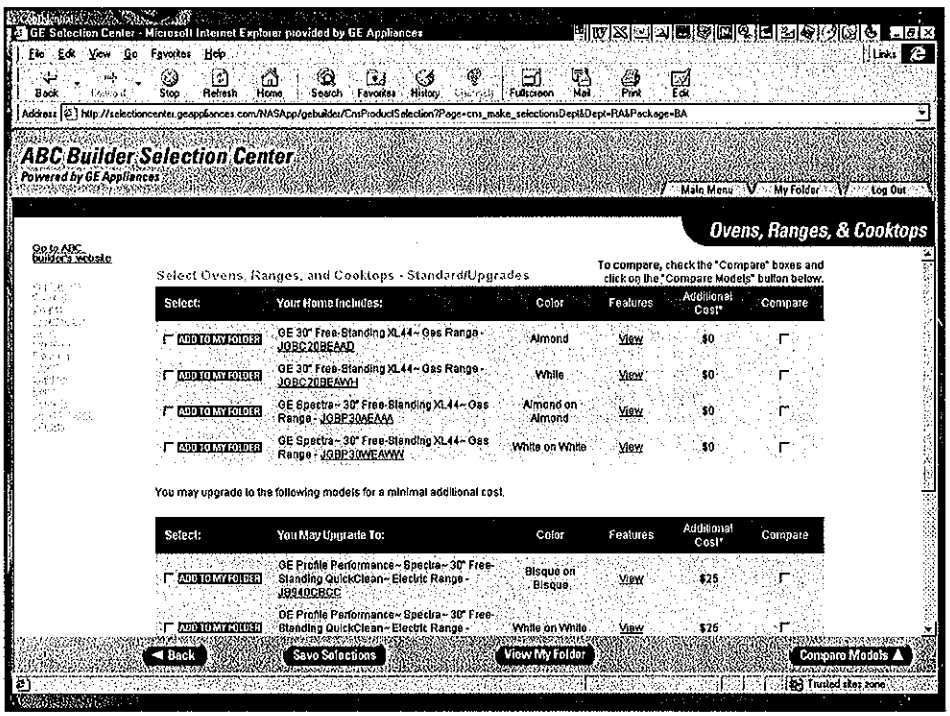


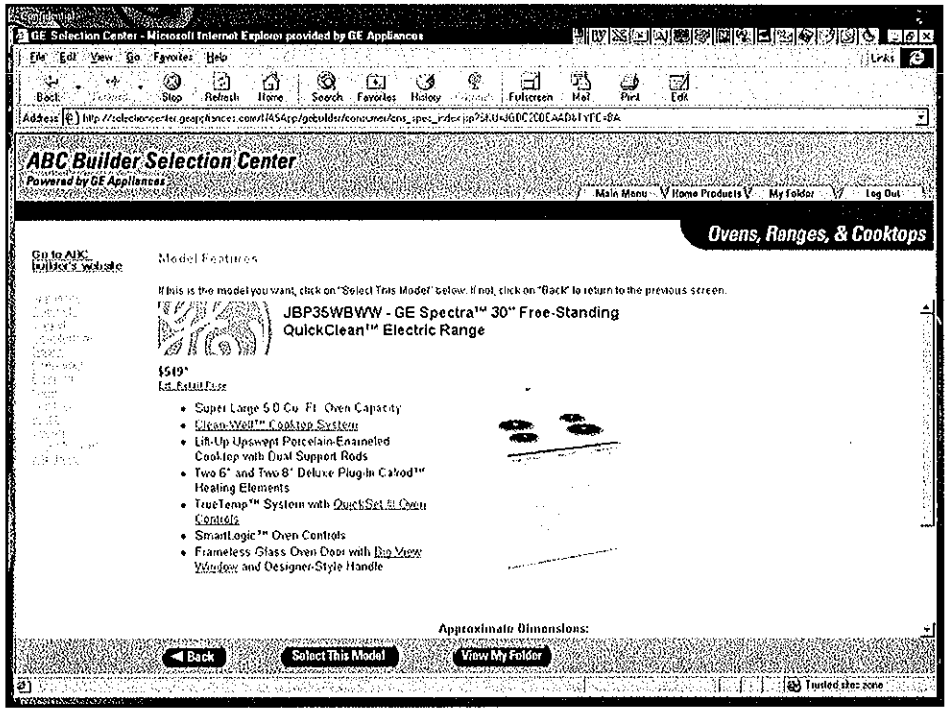



Connected Communities
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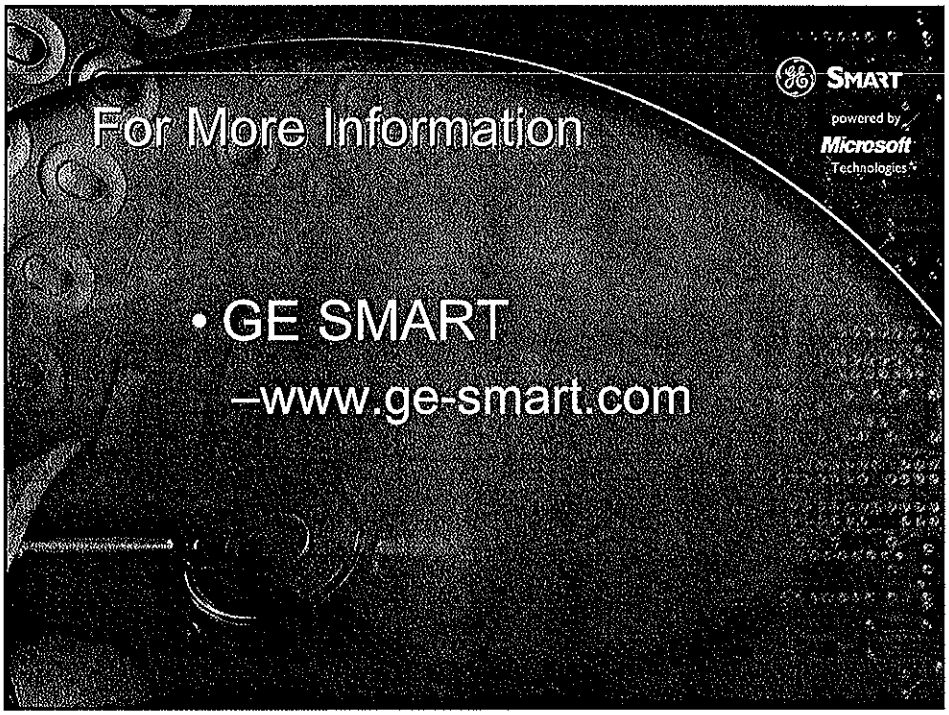

GE Selection Center.com - Main Menu - Microsoft Internet Explorer
File Edit View Go Favorites Help
Links
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail Print Edit
Address http://selectioncenter.geappliances.com/NASApp/gebuilder/CnsLogin
ABC Builder Selection Center
Powered by GE Appliances
Main Menu My Folder Log Out
Main Menu
Go to ABC builder's website
Welcome to ABC Builder Selection Center
Helping you create the home of your dreams...
Choose your appliances...
See your choices for the appliances included in your package, available upgrades, and optional appliances not included in your package, and then select the appliances that fit your taste and lifestyle.
Choose other home essentials...
Browse through some of our decorating elements to find colors, finishes, and accessories that best complement your home's design.
Trusted sites zone


GE Selection Center - Microsoft Internet Explorer provided by GE Appliances
ABC Builder Selection Center
Powered by GE Appliances
Main Menu
Home Products
My Folder
Log Out
Home Products
Go to ABC builder's website
Welcome to Home Products
Want help making decorating choices that reflect your taste and lifestyle? Click on an icon below.
Appliances
HVAC
Flooring - Tile
Faucets
Paint
Cabinets
Sinks
Countertops
Doors
Fireplaces
Flooring - Wood
Flooring Non-Wood
Lighting
Windows
Security
Carpet
Trusted sites zone


GE Selection Center - Microsoft Internet Explorer provided by GE Appliances
ABC Builder Selection Center
Powered by GE Appliances
Main Menu
My Folder
Log Out
Ovens, Ranges, & Cooktops
Go to ABC builder's website
Select Ovens, Ranges, and Cooktops - Standard/Upgrades
To compare, check the "Compare" boxes and click on the "Compare Models" button below.
Select:
Your Home Includes:
Color
Features
Additional Cost*
Compare
ADD TO MY FOLDER
GE 30" Free-Standing XL44~ Gas Range - JGBC20BEAAD
Almond
View
$0
GE 30" Free-Standing XL44~ Gas Range - JGBC20BEAWH
White
GE Spectra~ 30" Free-Standing XL44~ Gas Range - JGBP30AEAAA
Almond on Almond
GE Spectra~ 30" Free-Standing XL44~ Gas Range - JGBP30WEAWW
White on White
You may upgrade to the following models for a minimal additional cost.
You May Upgrade To:
GE Profile Performance~ Spectra~ 30" Free-Standing QuickClean~ Electric Range - JB940CBCC
Bisque on Bisque
$25
GE Profile Performance~ Spectra~ 30" Free-Standing QuickClean~ Electric Range -
White on White
$26
Back
Save Selections
View My Folder
Compare Models
Trusted sites zone


GE Selection Center - Microsoft Internet Explorer provided by GE Appliances
ABC Builder Selection Center
Powered by GE Appliances
Main Menu
Home Products
My Folder
Log Out
Ovens, Ranges, & Cooktops
Go to ABC Builder's website
Model Features
If this is the model you want, click on "Select This Model" below. If not, click on "Back" to return to the previous screen.
JBP35WBWW - GE Spectra™ 30" Free-Standing QuickClean™ Electric Range
$549*
Est. Retail Price
Super Large 5.0 Cu. Ft. Oven Capacity
Clean-Well™ Cooktop System
Lift-Up Upswept Porcelain-Enameled Cooktop with Dual Support Rods
Two 6" and Two 8" Deluxe Plug-In Calrod™ Heating Elements
TrueTemp™ System with QuickSet II Oven Controls
SmartLogic™ Oven Controls
Frameless Glass Oven Door with Big View Window and Designer-Style Handle
Approximate Dimensions:
Back
Select This Model
View My Folder


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Summary
• The Connected Home market will bring lots of new opportunities for everyone, but it will break some of the current business models.
• Many of the opportunities will come in the area of service.
• The Connected Home is going to be about partnerships.


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For More Information
• GE SMART
–www.ge-smart.com