Bridging 1394: a requirement for Residential Ethernet

Michael Johas Teener

Plumblinks

mike@teener.com

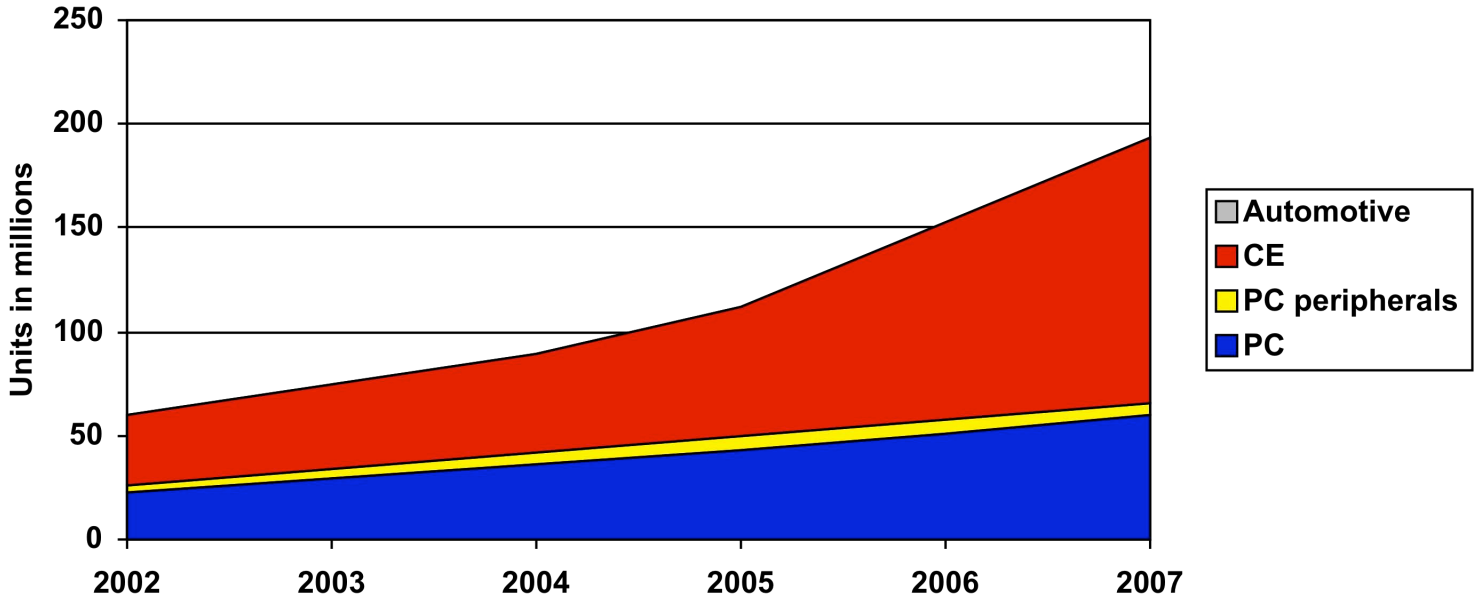
Agenda

- 1394 use in the home
  - Why and how
  - Current and projected market
- Networking 1394 busses
  - Current solutions
  - Why Ethernet?
- Challenges for Ethernet

1394 use in the home

- Computer peripherals
  - yes, but networking for computers is a solved problem
  - not a market
- Consumer electronics is the driver
  - virtually all digital camcorders
  - only way for digital recording devices to connect to DTV/STB
  - arguably the best way to interconnect CE cluster

Current 1394 market and projections



	2002	2003	2004	2005	2006	2007
PC	22.67	29.61	36.36	43.49	51.01	59.47
PC peripherals	3.84	4.41	5.31	6.06	6.85	5.94
CE	33.51	40.99	48.04	62.47	94.35	127.71
Automotive	0.00	0.01	0.04	0.10	0.40	0.75
Total	**60.02**	**75.02**	**89.75**	**112.12**	**152.61**	**193.87**

millions of units shipped

source: In-Stat-MDR report IN030582MI, May 2003, reproduced by permission

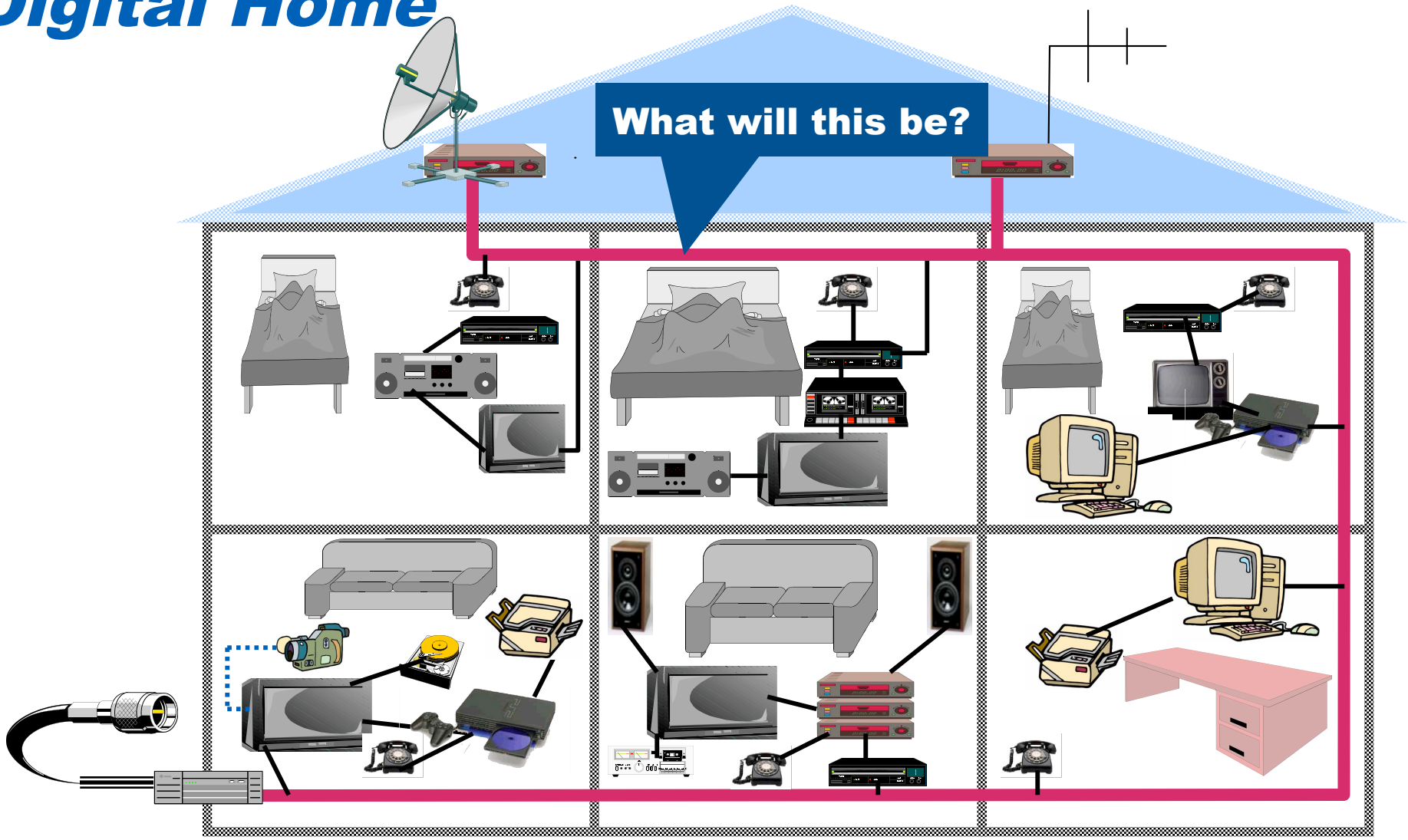
Market notes

- Roughly 65% of CE devices with 1394 in 2007 will be DTVs, STBs, or "television peripherals"
  - Camcorders drop to about 15%
- CE devices sold in the US with 1394 in 2004
  - Over 60 DTV models
  - Over 20 STB models
  - Over 35 DVD recorder models
  - Over 10 DVHS models
- New markets include A/V receivers, SA/DVD-audio decks and personal audio (iPod-like-things)

Networking 1394 busses

- Small demand now
  - … but enough to support some business in UTP and FO repeaters
- Growth starts when a home has two DTVs
  - FCC DTV mandates 50% of sets ≥26" be DTV by July 2005
    - … and 100% by July 2006
    - … and all sets ≥13" and all VCRs, etc., with built-in tuners by July 2007
- So a backbone for 1394 is needed soon!

Interactive Multimedia Network for the Digital Home



Current solutions

- 1394b/c long distance
  - Cheap UTP at 100 Mbit/sec
    - … bandwidth scalability requires 1394.1 bridges
    - … 1394.1 spec approved, but products not yet available
  - More expensive UTP at 800 Mbit/sec
    - … really just a 1000baseT PHY!
    - … 1394c spec finished, but products not yet available
  - it's not Ethernet!
- 802.15.3 or 802.11e wireless
  - Hey, it's 802! That's close enough to Ethernet!
  - 1394 protocol adaption layer defined
    - … limited range
    - … QoS issues
    - … and how do you connect together the A/Ps?

Challenges for Ethernet

- 1394 isochronous (CE) applications expect:
  - Very low and deterministic network delay
    less than 1ms (small network) to 10ms (worst case)
  - Very little application-level buffering
    less than 300µs
  - Precise network-wide clocking
    deviation always less than 125µs, and locally less than 5µs
  - Very low clock jitter for timestamps
    Short term less than 0.1µs, long term is effectively zero
  - Resource management supported in every device, no matter how simple
    bandwidth allocation, recovery of resources, etc., etc.

Summary

- 1394 is the current standard for digital CE interconnect
  - and the number and types of devices is growing rapidly
- Currently, networking 1394 devices cannot be done using Ethernet
  - at least, not with the expected QoS

Therefore, bridging 1394 buses should be one of the requirements for Residential Ethernet

Thank you!