Ethernet in the First Mile

Considerations for Project Scope

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What is meant by "Ethernet in the First Mile" ?

- A distance ?
- A media type ?
- A transmission speed ?
- A topology ?
- A feature set ?
- An application ?
- A service ?
- A market ?

Two views

1) Build an Ethernet network in a new physical environment known as the First Mile.

2) Build a new network that delivers Ethernet "services" to subscribers in the First Mile.

If our goal is an Ethernet network ...

Then we focus on Physical Layer modifications/additions required for the new environment:

- Environment
  - In Building: MTU, MDU
  - Out of Building: Single Family Residence
- Media type
  - Twisted pair, fiber, coax, or air
- Distance
  - From customer to the curb/basement
  - From the curb/basement to a provider facility

If our goal is an Ethernet service ...

- Then it needs to be Ethernet at the endpoints:
  - Ethernet frame format, size, addressing
  - Connectionless transfer of packetized data
- But the network itself can be anything:
  - Circuit switching, tunnels, cells, rings, …
- And as a committee we "focus" on:
  - Security, Quality of Service, Provisioning, Billing
  - Monitoring, Operations, Management
  - Network topology, data transport and routing mechanisms
  - Resiliency, redundancy, restoration

Recommendation

- Separate the physical environment requirements of the First Mile from the requirements of a provider/subscriber network model.
  - The scope of an Ethernet in the First Mile project should undoubtedly include new or modified Physical Layer specifications below the current Ethernet MAC.

- Tread softly regarding "service level" modifications to Ethernet.
  - The ability to provide security, QoS, resiliency, etc. is achieved today using other standard protocols (from 802.1, IETF) over the Ethernet MAC. There is clearly an argument for specifying mechanisms at the Data Link Layer to better support these features, but
    - it is new territory for 802.3,
    - is not specific to the First Mile,
    - greatly affects the scope of our undertaking, and
    - risks losing the "look and feel" of Ethernet

Above all:
Keep it Ethernet

Ethernet Religion

- The question "Is it Ethernet?" has to be asked.

- It does not have to turn into a religious issue.

- Identify the reason why the prospect of using Ethernet in the First Mile attracted so much attention. There is some implied value in the prospect of bringing Ethernet technology to this market.

- There is concern that wholesale change to the technology will change or lose that implied value, in which case it would be inappropriate to call it Ethernet.

- In the end, it's Ethernet if we say it's Ethernet.

Ethernet Branding

- This committee controls the brand.
- If all that is really valuable about Ethernet is the name, then we can take whatever technology (access method, frame format, addressing scheme, …) we can conceive, call it Ethernet, and it will be successful.
- If this were true, the only real problem with ATM is that they didn't call it the Ethernet Forum.
- There is something more substantial that is represented by the brand.
- So how do we get past "I can't tell you what it is, but I know it when I see it!"

Above all: Keep it Ethernet

- As in previous 802.3 projects, EFM should have a set of objectives that explicitly protect compatibility with the existing Ethernet standard:
  - Preserve the Ethernet/802.3 frame format at the MAC Client Interface.
  - Preserve the minimum and maximum frame size of the current 802.3 standard.
  - Support full duplex operation only.
  - Support topologies constructed with point-to-point links between MACs.
  - Support 802.1 and 802.3 standard suite (.1D, .1p/Q, .3x, .3ac, .3ad, …)
  - Enable simple bridging to other speeds and media types.

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How much change is too much change?

- The most significant changes to Ethernet to date have been
  - 802.3x: Change the topology and access method
  - 802.3ac: Change the frame format and size
- In each case the change was rifle shot vs. shotgun:
  - Change only one thing at a time
  - If the objectives require several fundamental changes, then maybe it really isn't Ethernet
- Consider the compatibility with existing equipment
  - What happens when an old bridge sees a new frame?
  - Can you plug an old DTE into the new topology?
  - If there is no obvious way to integrate the old with the new, then maybe it really isn't Ethernet.

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The "simple bridging" test

- Ethernet is:
  - Packetized data transport.
  - Variable length packets within defined bounds.
  - Asynchronous (no network wide clock distribution)
  - Connectionless (no state carried from one packet to another)
  - Addressing: Each packet self-addressed with a globally unique value of a defined size.

- If you change:
  - the address bit order then you can still bridge pretty easily, but if you change the address size or don't carry the address in each packet then bridging is very difficult.
  - the packet size then bridging is very difficult.

The "customer experience" test

- Harder to define, more subjective.
- Ethernet is:
  - Faster, simpler, cheaper.
  - Simple to install / configure / debug.
  - Familiar
  - Multivendor interoperability assumed.
- Will it be accepted as Ethernet if:
  - If you have to play "who ate the token"?
  - If you have to create a circuit before sending a packet?
  - If you have to learn a new access control method?
  - If you have to tune each link?

What is Ethernet?

- Ethernet is whatever we say it is.
- What we decide to call Ethernet is largely a subjective decision.
  - The "simple bridging" and "customer experience" tests are not complete, certainly not necessary and sufficient tests for what is Ethernet. However they can help the analysis and discussion of what is Ethernet.
- There is a history, culture, and value proposition that characterizes this committee and the scope of the standards it generates.
  - Although intangible, it sets expectations of what is Ethernet and what isn't.

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Thank you!