EPoC Channel Model Ad Hoc

IEEE p802.3bn EPoC

Channel Model Ad Hoc committee

Teleconference

March 7, 2013

Agenda

- Patents
- Minutes from previous call and Attendance
- Parameter List
- Topologies
- Plans & Action Items

Instructions for the WG Chair

The IEEE-SA strongly recommends that at each WG meeting the chair or a designee:

- **Show slides #1 through #4 of this presentation**
- **Advise the WG attendees that:**
  - The IEEE's patent policy is described in Clause 6 of the *IEEE-SA Standards Board Bylaws*;
  - Early identification of patent claims which may be essential for the use of standards under development is strongly encouraged;
  - There may be Essential Patent Claims of which the IEEE is not aware. Additionally, neither the IEEE, the WG, nor the WG chair can ensure the accuracy or completeness of any assurance or whether any such assurance is, in fact, of a Patent Claim that is essential for the use of the standard under development.
- **Instruct the WG Secretary to record in the minutes of the relevant WG meeting:**
  - That the foregoing information was provided and that slides 1 through 4 (and this slide 0, if applicable) were shown;
  - That the chair or designee provided an opportunity for participants to identify patent claim(s)/patent application claim(s) and/or the holder of patent claim(s)/patent application claim(s) of which the participant is personally aware and that may be essential for the use of that standard
  - Any responses that were given, specifically the patent claim(s)/patent application claim(s) and/or the holder of the patent claim(s)/patent application claim(s) that were identified (if any) and by whom.
- The WG Chair shall ensure that a request is made to any identified holders of potential essential patent claim(s) to complete and submit a Letter of Assurance.
- It is recommended that the WG chair review the guidance in *IEEE-SA Standards Board Operations Manual* 6.3.5 and in FAQs 12 and 12a on inclusion of potential Essential Patent Claims by incorporation or by reference.

Note: **WG** includes Working Groups, Task Groups, and other standards-developing committees with a PAR approved by the IEEE-SA Standards Board.

(Optional to be shown)

Participants, Patents, and Duty to Inform

All participants in this meeting have certain obligations under the IEEE-SA Patent Policy.

- Participants [Note: Quoted text excerpted from IEEE-SA Standards Board Bylaws subclause 6.2]:
  - "Shall inform the IEEE (or cause the IEEE to be informed)" of the identity of each "holder of any potential Essential Patent Claims of which they are personally aware" if the claims are owned or controlled by the participant or the entity the participant is from, employed by, or otherwise represents
    - "Personal awareness" means that the participant "is personally aware that the holder may have a potential Essential Patent Claim," even if the participant is not personally aware of the specific patents or patent claims
  - "Should inform the IEEE (or cause the IEEE to be informed)" of the identity of "any other holders of such potential Essential Patent Claims" (that is, third parties that are not affiliated with the participant, with the participant's employer, or with anyone else that the participant is from or otherwise represents)
- The above does not apply if the patent claim is already the subject of an Accepted Letter of Assurance that applies to the proposed standard(s) under consideration by this group
- Early identification of holders of potential Essential Patent Claims is strongly encouraged
- No duty to perform a patent search

Patent Related Links

All participants should be familiar with their obligations under the IEEE-SA Policies & Procedures for standards development.

Patent Policy is stated in these sources:

IEEE-SA Standards Boards Bylaws

http://standards.ieee.org/develop/policies/bylaws/sect6-7.html#6

IEEE-SA Standards Board Operations Manual

http://standards.ieee.org/develop/policies/opman/sect6.html#6.3

Material about the patent policy is available at

http://standards.ieee.org/about/sasb/patcom/materials.html

If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org or visit http://standards.ieee.org/about/sasb/patcom/index.html

This slide set is available at https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.ppt

Call for Potentially Essential Patents

- If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance:
  - Either speak up now or
  - Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible or
  - Cause an LOA to be submitted

Other Guidelines for IEEE WG Meetings

- **All IEEE-SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.**
  - **Don't discuss the interpretation, validity, or essentiality of patents/patent claims.**
  - **Don't discuss specific license rates, terms, or conditions.**
    - Relative costs, including licensing costs of essential patent claims, of different technical approaches may be discussed in standards development meetings.
      - Technical considerations remain primary focus
  - **Don't discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.**
  - **Don't discuss the status or substance of ongoing or threatened litigation.**
  - **Don't be silent if inappropriate topics are discussed … do formally object.**

See *IEEE-SA Standards Board Operations Manual*, clause 5.3.10 and "Promoting Competition and Innovation: What You Need to Know about the IEEE Standards Association's Antitrust and Competition Policy" for more details.

Minutes

- minutes from 3/1 Call
  - Any corrections?

Parameter List

- Progress report
  - Clarify highest RF Spectrum needed (1.2 or 1.7 GHz) with RF Spectrum ad Hoc

Topology	US	DS	March Madness[1]	Presentation
Node +6	PHX 1301	PHX 1301	Yes	2
Node +3 (Baseline)	2/21 Call	2/21 Call	Yes	2
Node +0 <1GHz	2/15 Call	2/15 Call	Yes	2
Node +0 >1GHz			TBD	
Node +0 MDU			TBD	
Node +3 Analog			Yes	2
others				
Baseline Channel	Derive from N+3		Yes	1
Notes 1) Motion to accept in March meeting.				

Topologies

- Illustrations

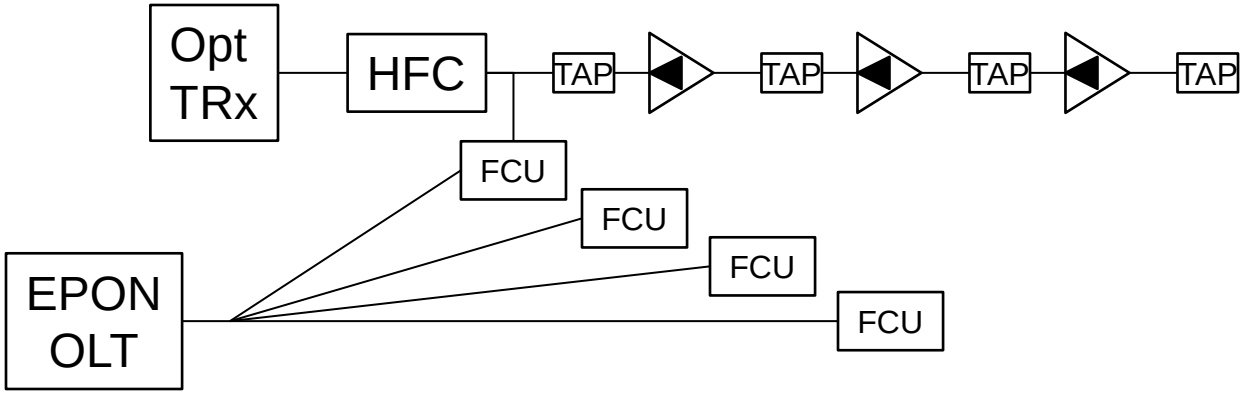
Topology	March Madness	Presentation
Node +6 (digital EPON distribution)	Yes	2
Node +3 (digital EPON distribution)	Yes	2
Node +0 (Last Amp < 1GHz)	Yes	2
Node +0 (Last Amp < 1.8GHz)	TBD	
Node +0 (All Passive/MDU)	TBD	
Node +3 (analog EPoC distribution)	Yes	
EPoC Only (no HFC)		
Baseline Channel (Node +3 digital)	Yes	1

Topologies

- Drop/Premise topologies

Topology	March Madness	Presentation
Typical	Yes	1
Not Preferred	Yes	2
All IP	Yes	2
Baseline (Typical)	Yes	1

Baseline Channel Topology



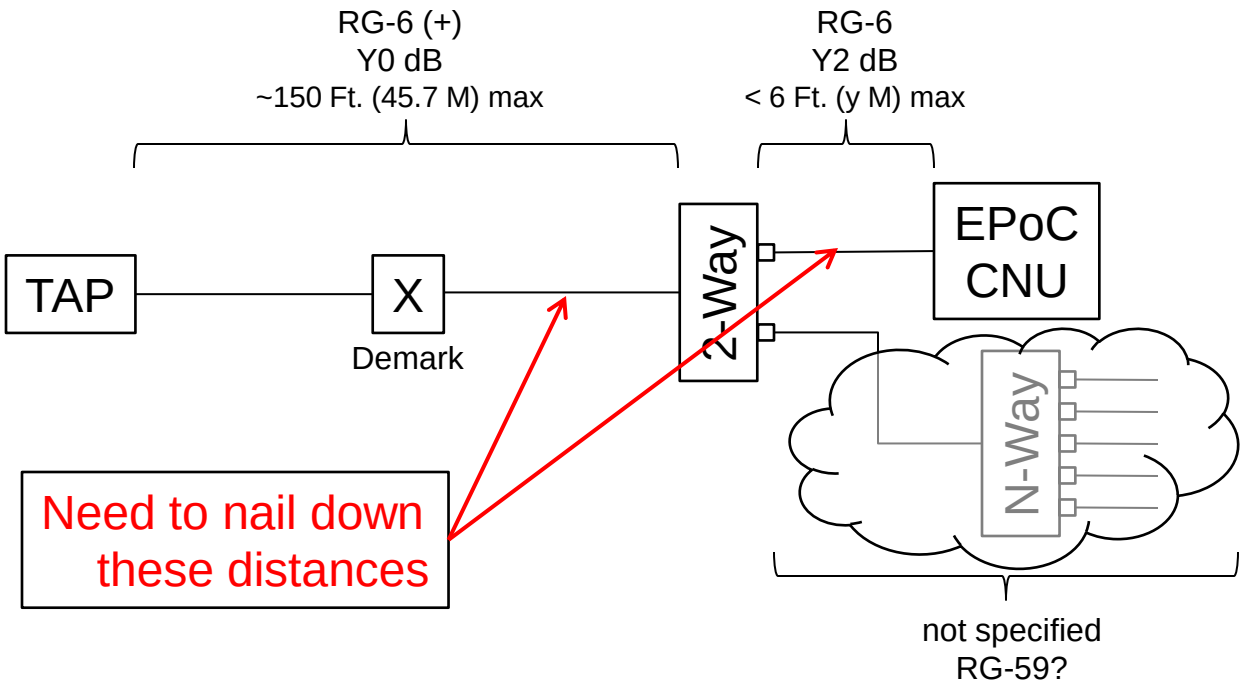
- Node +3 (digital EPON distribution)

- Topology parameters needed:

1. Optical reach of HFC networks
2. Optical reach of EPON networks per 802.3
3. All digital channel loading assumed
4. Amplifier spacing; typcal and max. ex: typical ≤ 800 ft. maximum ≤ 1500 ft.
5. Feeder cable types; ??
6. Drop Cable types & reach
   - RG 6, ≤ 150 ft. (45.7 M)

Drop / Subscriber Premise

Typical



Include in Presentation 1

Proposed Motion #1

Adopt the Channel model parameter lists and topology illustrations shown in *filename*.pdf slides *A-B* as baseline channel conditions.

Moved: Duane Remein

Second:

For: __

Against: __

Abstain: __

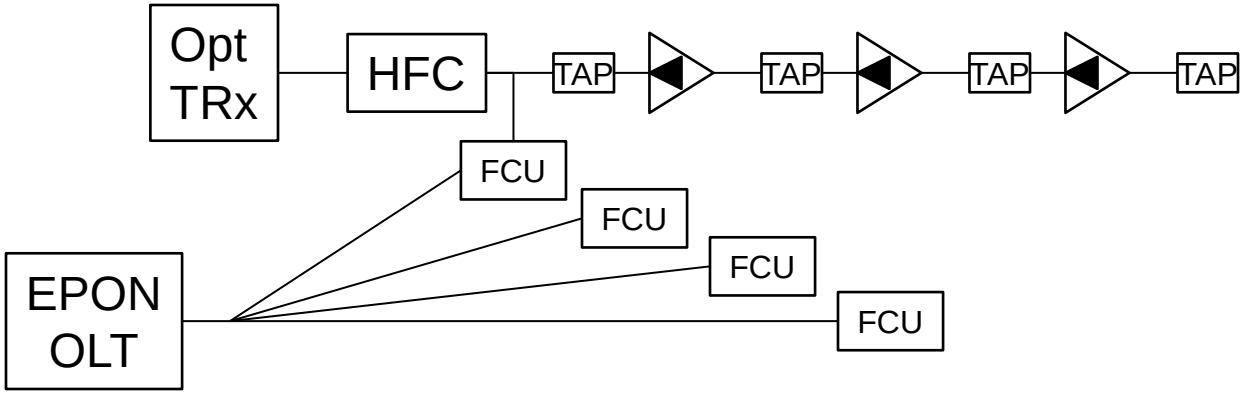
Motion is Techincal (≥ 75%)

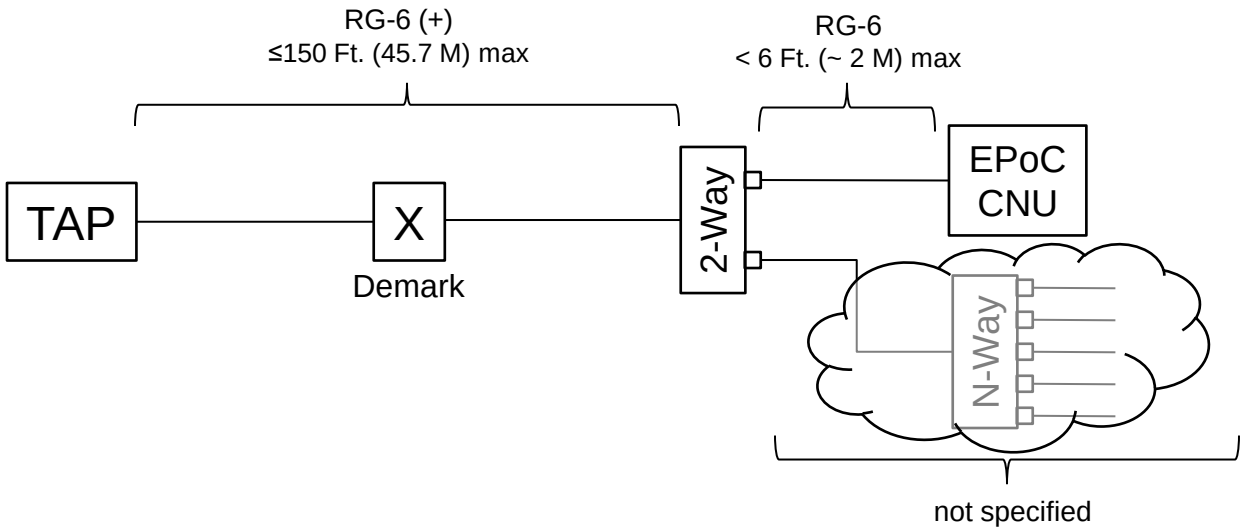
Motion is Procedural (> 50%)

Motion Passes/Fails

Include in Presentation 1

Baseline Topology





Proposed Motion #2

Include in Presentation 2

Adopt the Channel model parameter lists and topology illustrations shown in *filename*.pdf slides *A-B* as exemplar channel conditions for the associated topologies (Node+6, Node+3 with digital distribution, Node+3 with analog distribution, and Node+0< 1GHz)

Moved: Duane Remein

Second:

For: __

Against: __

Abstain: __

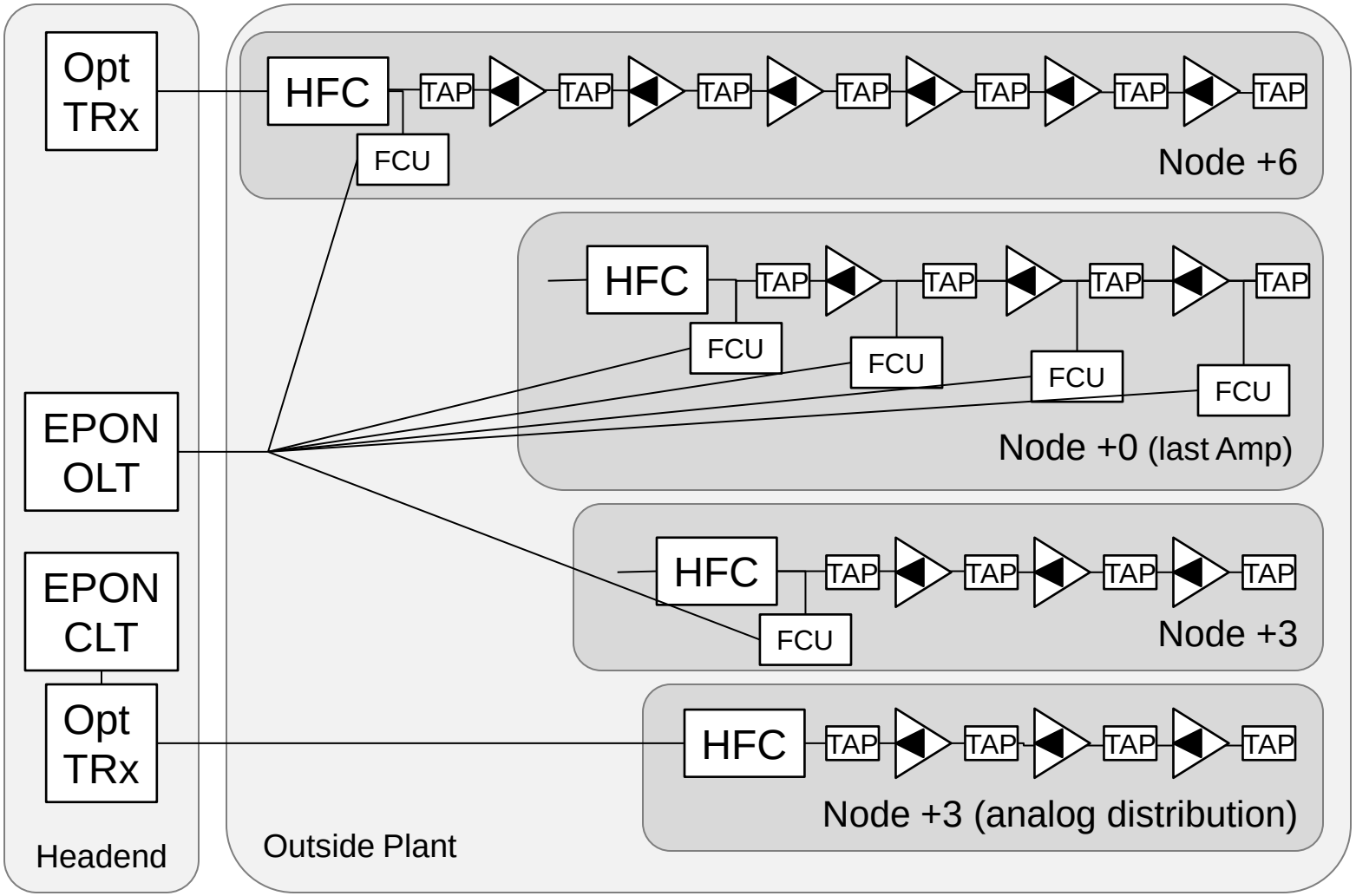
Motion is Techincal (≥ 75%)

Motion is Procedural (> 50%)

Motion Passes/Fails

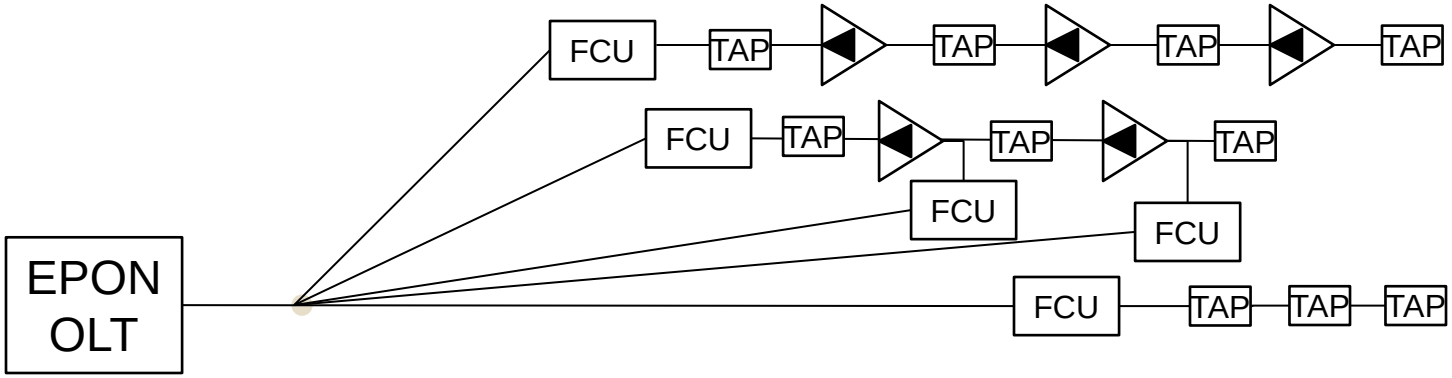
Include in Presentation 2

Informative Topologies



Info Only

EPoC Only (no HFC)



- Variations
  - Node +0 (last Amp)
  - Node + N (how big is N)
- Details needed:
  - Diplexer connecting EPoC to COAX

- Topology parameters needed:

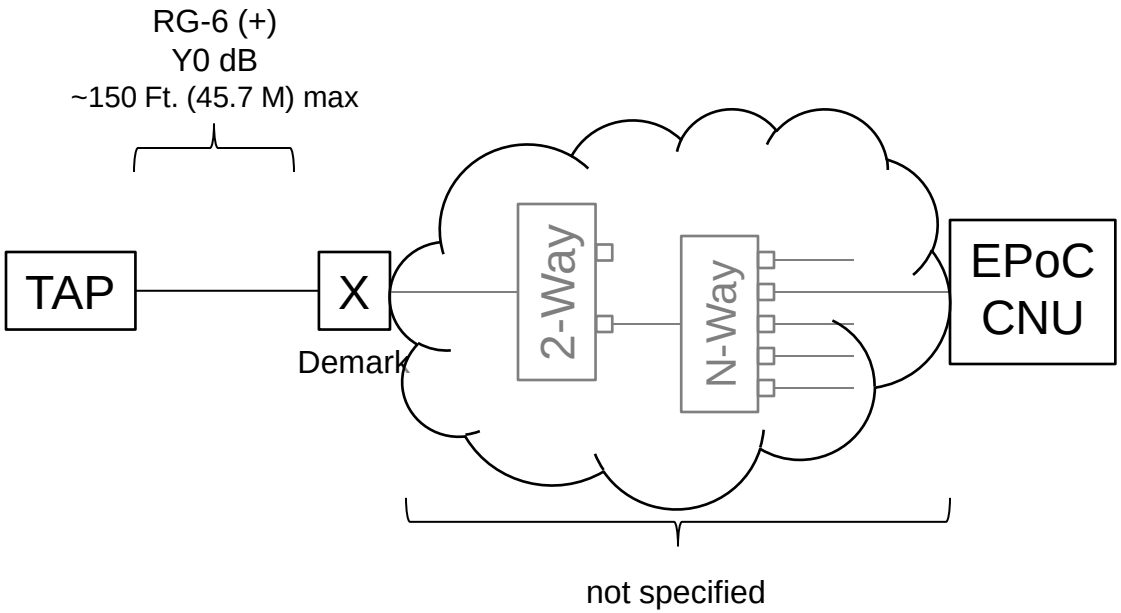
1. Optical reach of HFC networks
2. Optical reach of EPON networks
3. Channel loading of HFC networks (can all digital be assumed?)
4. Amplifier spacing; typical and max.
   ex: typical ≤ 800 ft. maximum ≤ 1500 ft.
5. Feeder cable types
6. Drop Cable types & reach

Include in Presentation 2

Drop / Subscriber Premise

Not Preferred

(EPoC Node located in unspecified premise wiring)

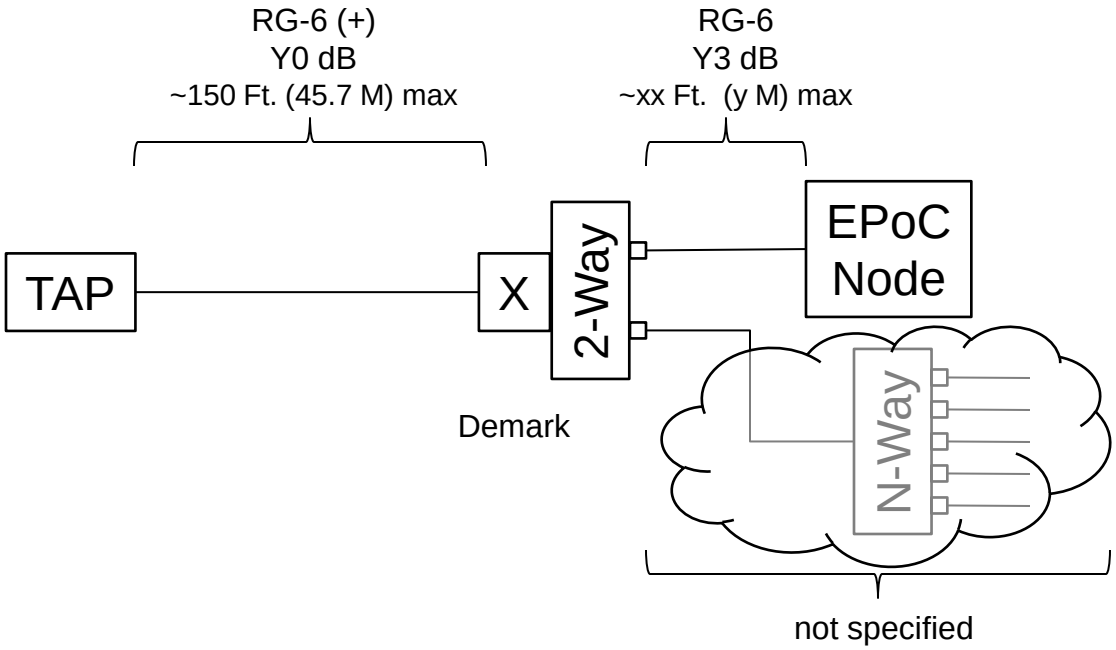


Info only

Drop / Subscriber Premise

Better

(2-Way splitter integrated with Demark)

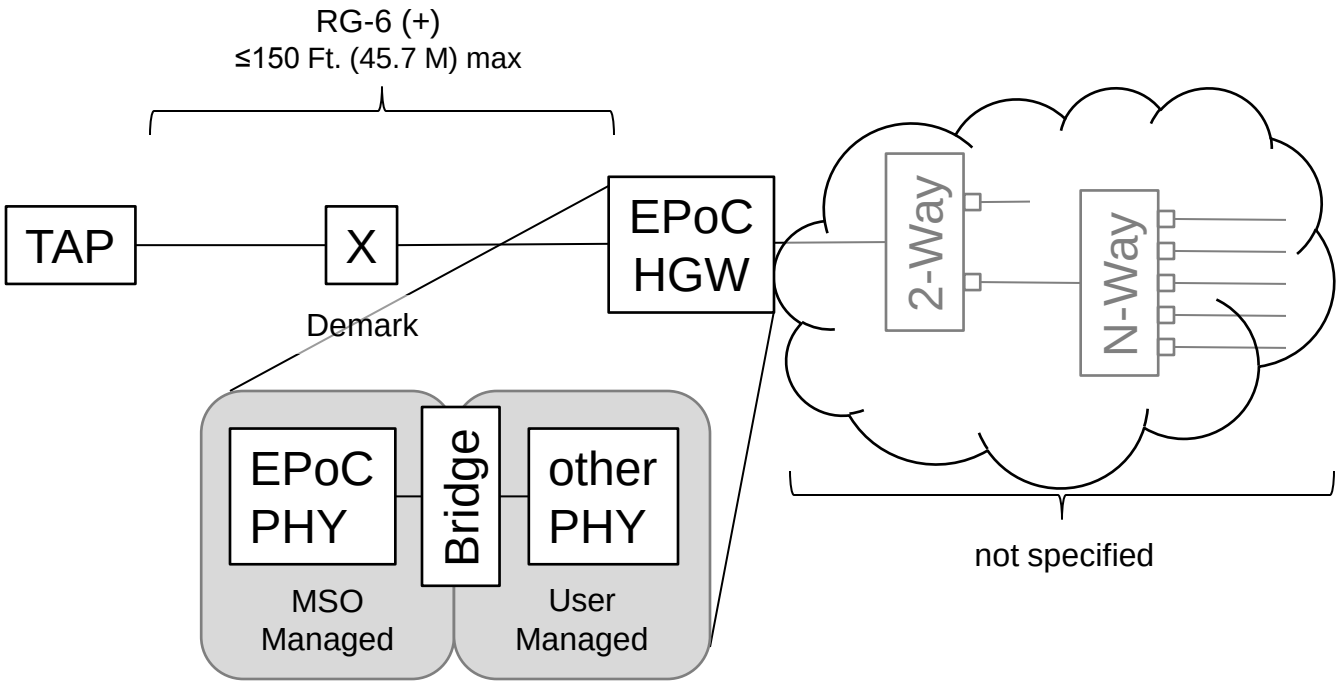


Include in Presentation 2

Drop / Subscriber Premise

What we dream of … All IP

(Demark Gateway with isolated home network)



Open Items

- US and DS absolute group delay across amplifiers, diplexers etc.
  - Needed to assess how accurately timing can be accomplished in EPoC
  - Need physical group delay (absolute measure) not envelope delay distortion (a relative measure)

Plans & Actions

- Prep & review Baseline & Info presentations

- Next Call is NOT SCHEDULED due to CableLabs F2F in Orlando

THANK YOU

Static Model

- Main author has withdrawn
- Some tools available on-line
  - See: http://www.elsevierdirect.com/v2/companion.jsp?ISBN=9780123744012
    Special thanks to Jim Farmer and Hesham ElBakoury
  - Cascaded Noise Distortion Calculator
  - Single-Wavelength Performance Calculator
  - Optical Crosstalk Individual Mechanisms
  - Optical Crosstalk Summary
  - Micro
  - Return Level Calculator
  - SOAR

Objectives (1/3)

- Specify a PHY to support subscriber access networks capable of supporting burst mode and continuous mode operation using the EPON protocol and operating on point-to-multipoint RF distribution plants comprised of either amplified or passive coaxial media.
- Maintain compatibility with 1G-EPON and 10G-EPON, as currently defined in IEEE Std. 802.3 with minimal augmentation to MPCP and/or OAM if needed to support the new PHY.
- Define required plant configurations and conditions within an overall coaxial network operating model.

Objectives (2/3)

- **Provide a physical layer specification that is capable of:**
  - A baseline data rate of 1 Gb/s at the MAC/PLS service interface when transmitting in 120 MHz, or less, of assigned spectrum under defined baseline plant conditions;
  - A data rate lower than the baseline data rate when transmitting in less than 120 MHz of assigned spectrum or under poorer than defined plant conditions;
  - A data rate higher than the 1Gb/s baseline data rate and up to 10 Gb/s when transmitting in assigned spectrum and in channel conditions that permit.
- **PHY to support symmetric and asymmetric data rate operation.**

Objectives (3/3)

- **PHY to support symmetric and asymmetric spectrum assignment for bidirectional transmission.**
- **PHY to support independent configuration of upstream and downstream transmission operating parameters.**
- **PHY to operate in the cable spectrum assigned for its operation without causing harmful interference to any signals or services carried in the remainder of the cable spectrum.**
- **PHY to have:**
  - a downstream frame error ratio better than 10^-6 at the MAC/PLS service interface;
  - an upstream frame error ratio better than 5x10^-5 at the MAC/PLS service interface.

Ad Hoc Mission Statement

- Ad Hocs purpose/deliverables are to:
  - Make Channel Model recommendations to the Task Force, including
    - "The Model", "How to use" documentation, Any tools, templates, etc.
  - Maintains & updates the Channel Model for TF use
- Other requirements
  - Does not create "The Model"
  - Act's as focus for input from MSOs: e.g.,
    - North American
    - European
    - China
- Evaluate need/desire for a channel model informative annex

Ad Hoc Mission Statement (cont)

- Channel Model Purpose
  - Purpose 1: To facilitate the evaluation of multiple PHY modulation proposals for use in 802.3bn
  - Purpose 2: To facilitate the selection of a range of PHY parameters within the selected PHY proposal to allow adaption to changing PHY conditions within the coax environment
- Channel Model Scope
  - Model should be limited to the minimum set of critical parameters necessary for above purposes.

Tools

- Simulation
  - GNU Octave
  - MatLab
- Static Model (Excel)
- Parameter List(Excel)

baseline channel conditions

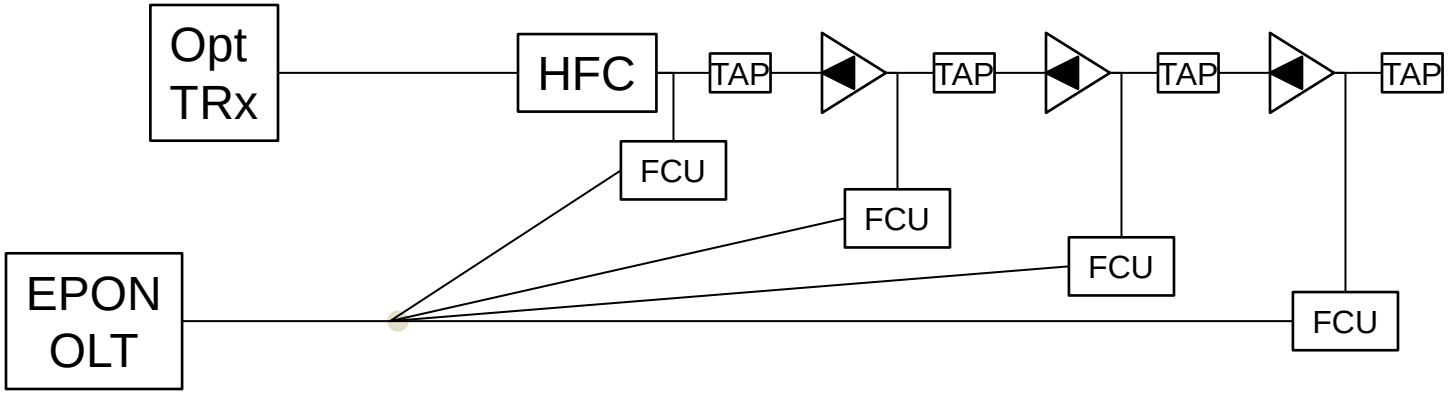
- What do we consider “Baseline”?
  - Our objectives reference “baseline channel conditions”
  - In order to assess if we have met our objectives (i.e., our contract with the WG) this Ad Hoc should recommend what is considered “baseline”
    - Typical ?
    - Limit ?
    - Good ?

Straw Poll

- Straw Poll text.

- Yes _____
- No _____
- Other _____

Node +0 (Last Amp)



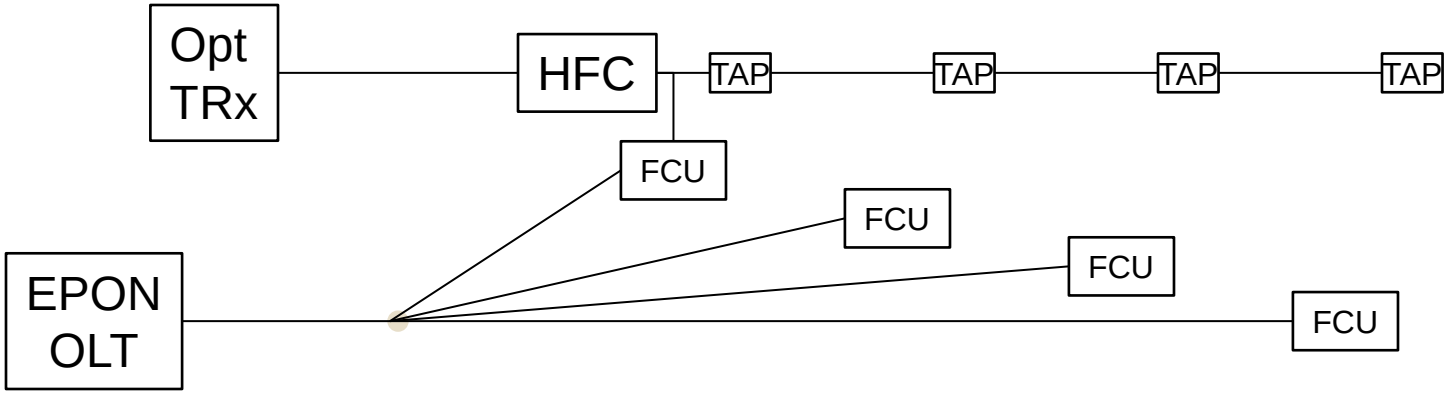
- Details needed:
  - Diplexer connecting EPoC to COAX
  - Blocking filter at Amp

Possibly include in table with N+0 (all passive)

- Topology parameters needed:

1. Optical reach of HFC networks
2. Optical reach of EPON networks
3. Channel loading of HFC networks (can all digital be assumed?)
4. Amplifier spacing; typical and max.
   ex: typical ≤ 800 ft. maximum ≤ 1500 ft.
5. Feeder cable types
6. Drop Cable types & reach

Node +0 (All Passive)



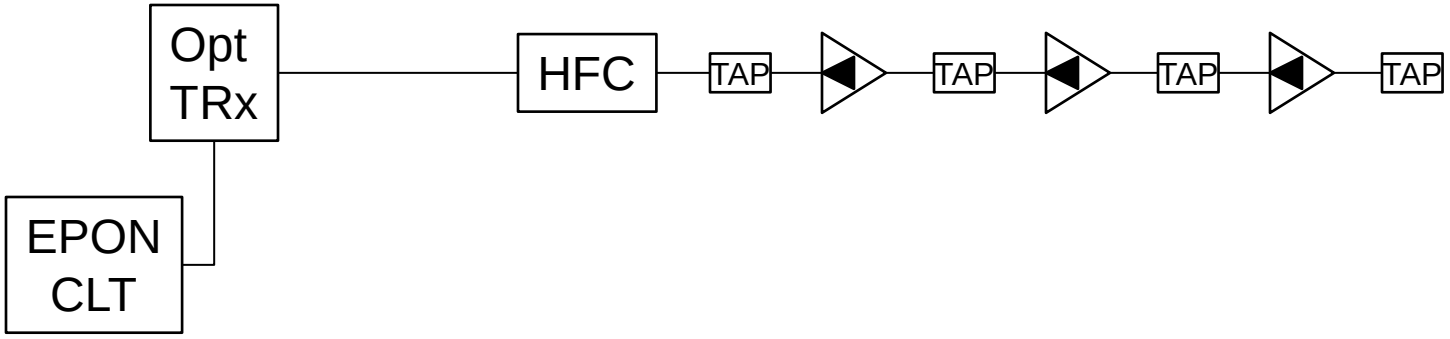
- Details needed:
  - Diplexer connecting EPoC to COAX

- Topology parameters needed:

1. Optical reach of HFC networks
2. Optical reach of EPON networks
3. Channel loading of HFC networks (can all digital be assumed?)
4. Amplifier spacing; typical and max.
   ex: typical ≤ 800 ft. maximum ≤ 1500 ft.
5. Feeder cable types
6. Drop Cable types & reach

Low Priority

Node +3 (analog EPoC distribution)



- Early Deployments
- Do we need to define a “Node+N” topology?
  - How big is N?
- Details needed:
  - Diplexer connecting EPoC to COAX

- Topology parameters needed:

1. Optical reach of HFC networks
2. Optical reach of EPON networks
3. Channel loading of HFC networks (can all digital be assumed?)
4. Amplifier spacing; typical and max.
   ex: typical ≤ 800 ft. maximum ≤ 1500 ft.
5. Feeder cable types
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