ITU - Telecommunication Standardization Sector Temporary Document 2012-06-4A-U20R1

STUDY GROUP 15 Original: English

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Question: 4a/15

SOURCE[1]: Associate Rapporteur for G.fast

TITLE: G.fast: Updated Issues List for G.fast

ABSTRACT

This document is the updated Issues List for the work on G.fast. This Issues List represents the output of the Q4a meeting, 18 – 22 June, 2012. Changes with respect to 2012-05-4A-U20R1 are shown with revision control.

Call for papers:

1) FEXT and noise models above 30 MHz, up to no more 250 MHz

- Investigate necessity of including impulsive and other non-stationary noises

2) PMD: full proposals on modulation parameters (symbol rates, IFFT sizes, operating bandwidth, cyclic extensions, guard intervals, PSD masks)

- Cyclic extension(s) to address the different loop characteristics
- Based on rate/reach requirements
- Goal is to decide on number of sub-carriers at the July 2012 meeting.

3) PMS-TC (TDD frame structure including frame period)

- Details on Sync symbols, probe symbols, preamble, initialization/training

4) How bonding should be specified (higher layer outside the node, 998.2 style, as part of the transceiver)

5) Reference models

6) Liaison with the appropriate bodies (e.g., ITU-R, CISPR) on EMC related issues.

7) Channel estimation, probing signals

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1. Guidelines for authors preparing contributions

a) Always include a "Summary" section <u>at the end of</u> the contribution. Include in this summary:

- A separate bullet item for each point that you seek agreement on, or preferably a concise description of your issue, formatted as it would appear on the Issues List. For example:

7.15	Open	Should the text proposed in 08AB-107 for §9.2 "Authentication and key management" be adopted as working text?	08AB-107

  - <u>Search the Issues List to verify if the issue exists **or not**. If the issue exists, refer to it. If the issue is new, determine where best to place the issue and propose a new issue number for it</u>.
    - <u>Do not re-use issue numbers that were deleted and removed from the Issues List.</u>
  - <u>Always use the latest version of the Issues List</u>! Several contributions have referred to issues that no longer exist!

- Be accurate and <u>concise</u> in your description of an issue. It should be worded in a way that the Editor can simply cut and paste the issue into the Issues List. The following are examples of <u>**what not to do**</u> for wording of an issue or for referencing an issue:

  - "This contribution proposes to adopt the presented working text into the draft"

    → This example lacks clarity. The Editor had to reword it to the issue 7.15 seen in the example above.

  - "Should G.hn specify ... based on the procedure described in <u>**this contribution**</u>"

    → Replace "this contribution" with the correct contribution number! Otherwise, when further references are added, it will not be clear which contribution it is referring to.

  - "This paper is intended to be discussed at the G.hn session and relates to <u>**Issue 5**</u> of the G.hn Issues list ... ."

    → Issue 5 is not an issue, it is an issue category. There are hundreds of issues within this category. Find the correct one(s) to refer to.

- Concerning the point above of being concise, try not to 'micro-manage' your proposal. Generating several pages of detailed issues related to a contribution will not help the committee to address your proposal (given our usual time constraints) and may make it more difficult for you to get your proposal adopted.

b) When submitting a minor update to a previous contribution, show the changes with revision control so readers will know what has changed.

c) Do not use coloured font for proposed text. Use revision control to highlight.

2. Issues List Structure

What has been referred to as the “Terms of Reference” and the “Living List” is combined into a single table, the **‘Issues List’**, consisting of 4 columns as shown below:

Item Number	Status	Item Description	Reference(s)

- The **‘Item Number’** uniquely identifies an issue for quick reference.
- The **‘Status’** of an issue shall be either **‘Open (date)’**, **‘Agreed (*resolution date*)’** or **'Closed *(resolution date)*'**.
- An issue may become partially resolved at some point in time. In this case, it shall be split apart. The unresolved part of the issue shall keep the original item number and Open status. The resolved part of the issue shall use the same number with an added numerical suffix (e.g., “9.1”) and shall have the status ‘Agreed (*resolution date*)’.
- The **‘Item Description’** delineates an issue as follows:
- ‘Open’ issues, which generally address what the issue is, shall be formatted as questions.
  Examples: “What should the PSD mask be for each of the Annexes?”
  “How should ADSL above ISDN be accomplished?”
- ‘Agreed (*resolution date*)’ issues, which generally address how the issue has been resolved, can be categorized as general **‘goals’** or **‘requirements’**, or as **‘specific actions’**.
- Goals shall be identified by using the words **‘that ... should ...’** in the delineation of an issue.
  Example: “that G.dmt should include a low-complexity PAR reduction technique”.
- Requirements shall be identified by using the words **‘that ... shall ...’** in the delineation of an issue.
  Example: “that a clear EOC channel shall be specified in G.dmt”.
- Specific actions shall be identified by using the words **‘to adopt ... ’** in the delineation of an issue. These are generally for adopting referenced text
  Examples: “to adopt RB-037 as the initial working text for G.dmt”
  “to adopt the text of CI-xx as the text for section y.y of G.dmt”.
- 'Closed (*resolution date*)' issues are those that will no longer be considered, either because it has been explicitly agreed to no longer consider them, or because they have been superceded by other agreements and are no longer pertinent.
- The **‘Reference(s)’** is a list of meeting contribution numbers that address a particular issue.

New items for the Issues List are generally identified in committee contributions. Only those issues that have been delineated in the ‘summary’ section of said contributions shall be added to the list. These issues are automatically added to the list as ‘**Open**’ issues (questions) without prior committee review. Upon review by the committee, these issues may become agreed goals, requirements, or specific actions.

New items for the Issues List may also be identified during committee deliberations and added to the list as either Open issues, Agreed goals, Agreed requirements or Agreed specific actions, based on approval by the committee.

OPEN issues will automatically be CLOSED after 3 meetings of inactivity. CLOSED issues will be deleted from the Issues List after one meeting cycle.

3. Issues List – G.fast

New Item Number	Status	Item Description	Reference(s)
1		**General issues**	
1.1	Agreed 20-Jan-11	that Q4/15 shall study the transceiver aspects of FTTdp, and issue a call for papers for discussion at the Feb 2011 Plenary.	11KH-047, 11KH-081, 11KH-090R1
1.2	Agreed 24-June-11	that a new Recommendation shall be developed to specify a single-pair solution to address the need for FTTdp deployments, where the technology can be extended to multi-pair operation (e.g., vectoring, bonding).	C-1251, 11GS3-087
1.3	Agreed 24-June-11	To a goal to consent G.fast by the end of 2012.	discussion
1.3.1	Agreed 24-June-11	To finalize the operating environment by the teleconference call on October 5, 2011	discussion
1.3.2	Open 3-Nov-11	Should a multi-phase roadmap be adopted for G.fast Recommendations per 11RV-049, to include: • phase 1 being production of a full bandwidth protocol specification in the form of a foundation document, and a cut down trial use standard; • Phase 2 to include development of vectoring functionality for G.fast; and • Phase 3 to include amendment of G.fast to reflect lessons learned from trials and merging vectoring and the trial use standard into a single document?	11RV-049
1.3.2.2	Open 22-Feb-12	In order to achieve optimal performance on tree topologies in dense areas, should vectoring be supported across multiple G.fast nodes?	2012-02-4A-037
1.3.2.3	Open 7-May-12	Should G.fast not preclude the support of vectored G.fast or vectored VDSL2 across nodes?	2012-05-4A-020
1.3.3	Open 3-Nov-11	Should G.fast take a multi-phased approach to bandwidth specification, with phase 1 considered for the first consent?	11RV-060
1.4	Agreed 14-Dec-11 Revised 2-Mar-12	G.fast shall specify point-to-point (P2P) operation using S-TDD and all necessary functionality to support the use of vectoring.	11RV-052, C1656R1, C1931, (2012-02-4A-053)
1.4.1	Agreed 14-Dec-11 Revised 2-Mar-12	that the functionality specified in Issue 1.4 shall be mandatory in the FTU-R and FTU-O.	
1.4.2	Agreed 22-June-12	that the G.fast specification shall not preclude the implementation of FTO-O modules with P2P operation on the fiber side.	2012-06-4A-039
1.6	Open 7-Dec-11	Should an annex specifying functionality for mobile backhaul application be created?	C1873R1, (2012-02-4A-035)
1.7	Agreed 7-Dec-11	that G.fast should define the functionality necessary to support reverse powering protocol(s) to be specified outside of G.fast, e.g., those being defined by ETSI TM-06.	discussion
1.7.1	Open 7-Dec-11	Should G.fast define reverse powering over twisted pair as an appendix/annex or a new document?	C1765
1.7.2	Agreed 18-June-12	that Q4a shall establish coöperation with ETSI TM6 on various issues related to G.fast and particularly on spectral compatibility between the components of the reverse power feeding (RPF) scheme and G.fast transceivers.	2012-06-4A-024

New Item Number	Status	Item Description	Reference(s)
1.7.2.1	Closed 22-June-12	Should the material presented in 2012-06-4A-024 be shared with ETSI TM6 as complimentary information addressing the G.fast and RPF spectral compatibility? • Prepared and approved liaison	2012-06-4A-024
2.		**Operator requirements**	(C-1471), (11BM-023), (11BM-024), (11BM-049), (11BM-064R3) (11TC1-BT3)
2.1		**General/Miscellaneous**	
2.1.1	Open 12-Sept-11	Should a G.fast node be able to work in a sealed water-tight enclosure?	11GS3-024
2.1.2	Agreed 4-Nov-11	that G.fast should support FTU-O module sizes from 1 to 16 ports.	11GS3-024, 2012-02-4A-040, 2012-05-4A-046
2.1.2.2	Agreed 10-May-12	that G.fast specification shall not preclude the implementation of FTU-O module sizes of up to 48 ports?	2012-02-4A-037, 2012-05-4A-020
2.1.2.3	Open 7-May-12	Should G.fast support FTU-O node sizes of 1, 4, 8, 16, 32 modularity?	2012-05-4A-033
2.1.2.4	Open 18-June-12	Should the G.fast specification not preclude the implementation of FTU-O module sizes of up to 100 ports, where each wire pair counts for one port and where a bonded double wire pair counts for two ports?	2012-06-4A-039
2.1.3	Open 12-Sept-11	Should G.fast not preclude the use of relays to bypass the G.fast node for unbundled lines?	11GS3-024, 2012-05-4A-044
2.1.5	Agreed 14-Dec-11	that support for some form of line testing capability shall be specified aimed at distinguishing between faults inside the customer premises and faults outside the customer premises. Whether this is to be specified in G.fast or G.lt is TBD.	C1899, (C1865)
2.1.6	Open 05-Dec-11	Should G.fast be low complexity, and have low power consumption, particularly for the network equipment to support a system requirement for reverse power feeding?	C1899, 2012-02-4A-020R1, 2012-05-4A-044
2.1.7	Agreed 2-Mar-12	that, in support of IEEE 1588, G.fast shall provide transport of ToD (Time of Day) similar to the means provided in G.993.2.	2012-02-4A-024
2.2		**Spectrum**	
2.2.1	Open 4-Aug-11	Should G.fast define PSDs specific to the locally powered configuration that maximize rate/reach?	11TC1-Verizon1
2.2.3	Open 05-Dec-11	Should G.fast be defined so that the full rate protocol can be applied at ½ the full rate sampling frequency, and the two versions coexist on the same DP to service CPE from different generations?	C1899, 2012-02-4A-020R1, 2012-05-4A-044
2.3		**Loops**	
2.3.1	Open 12-Sept-11	Should G.fast work on loop length of at least 200 m?	11GS3-024, 2012-02-4A-040, 2012-05-4A-046
2.3.1.1	Agreed 14-Dec-11	that G.fast should support triple-play services in a self install scenario on loops up to 200m long.	C1899, 2012-02-4A-040, 2012-05-4A-033, 2012-05-4A-046

New Item Number	Status	Item Description	Reference(s)
2.3.1.1.1	Open 14-Dec-11	What are the implications of self install (home network bridge taps, balance of in-premises wiring, POTS distribution arrangements, ‘zero touch’ provisioning, etc.)?	discussion
2.3.1.2	Agreed 14-Dec-11	that G.fast should support both operator installation isolating the internal phone wiring, and customer self-installation involving G.fast transmission over customers’ internal phone wiring.	C1899
2.3.2	Open 12-Sept-11	Should G.fast work on lower quality cables (e.g., untwisted pairs in the vertical rise)?	11GS3-024, (11RV-030), 2012-02-4A-037
2.3.4	Open 22-Feb-12	Should G.fast work on loop length of at least 250 m?	2012-02-4A-024
2.3.4.1	Agreed 10-May-12	that G.fast should support triple-play service on loops up to 250 m long.	2012-05-4A-020
(2.3.4.3)			
2.3.5	Agreed 10-May-12	To add the following statement to the Scope: “G.fast is intended to operate over loops up to approximately 250 m of 0.5 mm wire pair.”	2012-02-4A-037, 2012-05-4A-020
2.3.5.1	Open 22-Feb-12	Should G.fast be able to operate (synchronize) on in-house cabling with bridge taps?	2012-02-4A-037
2.3.6	Open 22-Feb-12	Should G.fast support operation over coax? Note: The same physical layer would be applied to twisted pair and coax. We consider a P2P topology also for coax. The only change for coax would be the adaptation to the coax medium and impedance. Of course conditions in using coax are different, e.g. there is no crosstalk expected.	2012-02-4A-040, 2012-05-4A-046
2.4		**Bonding**	
2.4.1	Open 4-Aug-11	Should G.fast support a bonding option in the standard?	11TC1-Verizon1, 2012-02-4A-040, 2012-05-4A-046, 2012-06-4A-039
2.4.2	Open 12-Sept-11	Should bonding be supported for up to 2 lines with an implementation loss < 5%?	11GS3-024, 2012-06-4A-039
2.4.3	Open 12-Sept-11	Should G.fast utilize Layer 2 bonding when required?	11GS3-087
2.4.4	Open 3-Nov-11	Should the G.fast transceiver functionality include 2-pair bonding? • See also Issue 1.2	11RV-045
2.4.4.1	Open 3-Nov-11	Should a G.fast transceiver support bonding fragments at the γ-O gamma reference point to enable operation with G.998.2 bonding?	11RV-045
2.5		**Service rates**	
2.5.1	Agreed 12-Sept-11 Revised 2-Mar-12	that the aggregated US/DS busy hour speed test rate + managed busy hour traffic rate (see Issue 2.5.15) for a given line should be at least: • 150 Mb/s @ 250m • 200 Mb/s @ 200m, • 500 Mb/s @ 100m, and • 500-1000 Mb/s for FTTB deployments @<100m, For the test conditions: 8 self-disturbers, TP100 cable, co-located CPEs for evaluating G.fast technologies, where the performance should be optimized for loop lengths up to 200m.	11GS3-024, 2012-02-4A-064R2, 2012-05-4A-033
2.5.1.1	Agreed 14-Dec-11	that the network operator shall be able to manage US and DS data rates independently on a per-line basis.	C1899

New Item Number	**Status**	**Item Description**	**Reference(s)**
(2.5.1.4)			
2.5.2	Agreed 2-Mar-12	that the offered bitrates shall be in increments of less than or equal to 20 Mbit/s.	11GS3-024
2.5.3	Agreed 12-Sept-11 Revised 2-Mar-12	that G.fast should support a bit rate at the gamma reference point up to at least 500 Mbit/s DS+US aggregate capacity while operating in the band above 17.664 MHz with an adequate guard band, in the presence of RFI and crosstalk 6 dB below a single disturber model, over a 50m loop of 0.5 mm cable.	11GS3-087
2.5.3.1	Open 05-Dec-11	Should it be a requirement that customer service rates up to at least 500 Mb/s DS+US aggregate capacity on a typical quiet single-pair taking into account a start frequency of the order 23 MHz and substantial notches in the VHF and DAB broadcast bands?	C1899, 2012-02-4A-020R1, 2012-05-4A-033, 2012-05-4A-044
2.5.3.2	Open 22-Feb-12	Should the agreed objective in issue 2.5.3.1 be met on at least 10% of BT DP sub-loops, and should this be verifiable by third party testing?	2012-02-4A-020R1, 2012-05-4A-044
2.5.4	Agreed 12-Sept-11 Revised 2-Mar-12	that the G.fast protocol shall not preclude an aggregate (US + DS) bit rate at the gamma reference point of at least 1 Gbit/s.	11GS3-087
2.5.5	Open 3-Nov-11	Should G.fast provide 1 Gbit/s service rates over a significant percentage of the use cases, including those with shared cables?	11RV-061
2.5.6	Open 3-Nov-11	Should the assured rate for managed services + assured rate for non-managed services per subscriber be at least 80 Mbit/s for an 8-port DP?	11RV-061
2.5.7	Open 7-Dec-11	What is the target error ratio of G.fast at the Gamma interface?	C1862R1
2.5.8	Open 7-Dec-11	How should sustainable data rate and the peak rate be defined?	C1931
2.5.8.1	Open 7-Dec-11	Should sustainable data rate and the peak rate be defined in terms of what percent of time and what percent of users these rates apply to?	C1931
2.5.8.2	Open 7-Dec-11	What are the sustainable aggregate net data rate and the peak rate statistics as a function of node size, at loop lengths up to 200 m in the presence of self-crosstalk and with AWGN at -140 dBm/Hz?	C1931, (2012-02-4A-043)
2.5.9	Open 05-Dec-11	Should the G.fast protocol be optimised for the aggregate US+DS speed range 100 Mb/s to 500 Mb/s?	C1899, 2012-05-4A-044
2.5.9.1	Open 22-Feb-12	Should maximising performance on difficult lines, and minimising service faults, have higher priority than achieving rates in excess of 500 Mb/s?	2012-02-4A-020R1, 2012-05-4A-044
2.5.10	Open 05-Dec-11	Should G.fast implementations simultaneously support a sustained DS service rate of at least 100 Mb/s for all customers on the node when the loop capacity permits?	C1899, 2012-02-4A-020R1, 2012-05-4A-044
2.5.10.1	Open 22-Feb-12	Should the sustained (assured) rate in agreement 2.5.10 comprise a QoS protected part and a best efforts part defined separately by the network operator via the MIB?	2012-02-4A-020R1, 2012-05-4A-044
2.5.11	Agreed 14-Dec-11 Revised 2-Mar-12	that G.fast should be able to operate down to 10 Mb/s DS + US aggregate bit rate at the gamma reference point to ensure that when deployed on an exceptionally long loop or with seriously degraded SNR the link will synchronize.	C1899
2.5.12	Open 22-Feb-12	Should the traffic models given in §2 of 2012-02-4A-031R1 and the associated definitions of bit rate primitives for evaluation of throughput performance of the various network architectures and varying network throughput loads be adopted?	2012-02-4A-031R1

New Item Number	Status	Item Description	Reference(s)

2.5.15	Agreed
	1-Mar-12
		to the following service rate definitions:
		• Assured Rate for Managed Services - The rate that is guaranteed by the operator to be available to a particular subscriber when needed by the active managed service application(s).
		  o Note: this rate is likely communicated by the operator to an end user in an indirect form (e.g. number of IPTV channels)
		  o Note: The amount of the assured rate resource that is not used by the end-user is available for use by any user (including the non-managed service of the reference user) served by the DP.
		• Busy Hour Speed Test - the average non-managed rate (in *N* speed test measurements) available to a particular subscriber under the condition where:
		  o all users served by the DP (including the user conducting the speed test) are carrying managed Busy Hour Traffic, where managed Busy Hour traffic consists of managed traffic during the busiest hour of a typical seven day consecutive period, and
		  o all other users served by the DP are carrying non-managed Busy Hour Traffic, where non-managed Busy Hour traffic consists of non-managed traffic during the busiest hour of a typical seven day consecutive period.
		• Peak rate (off hour) Speed Test – the maximum rate available to a particular subscriber under the condition where there is no other traffic served by the DP.
		• Assured Rate for Non-Managed Services - The rate that is guaranteed by the operator to be available to a particular subscriber when needed by the active non-managed service application(s).
		  o Note: this rate is a network engineering parameter which may or may not be communicated by the operator to an end user
		  o An example of Non-Managed service is High Speed Internet Access.
		  o Note: The amount of the assured rate resource that is not used by the end-user is available for use by any other user served by the DP.
			2012-02-4A-064R2

2.5.16	Open 7-May-12	Should G.fast achieve at least a bit rate performance parity with vectored VDSL2 (17MHz) on distances up to 400m?	2012-05-4A-020
2.5.17	Open 7-May-12	Should G.fast provide backward compatibility with vectored VDSL2 (17MHz) with an emulated VDSL2 performance as close as possible to native vectored VDSL2 on lines up to 800m?	2012-05-4A-020
2.6		**US/DS asymmetry**	
2.6.2	Open 12-Sept-11	Should the operator be able set the nominal asymmetry ratio for a DP by network management, where all systems on the same DP would use the same resource asymmetry ratio (time or frequency)?	11GS3-087
2.6.2.1	Open 7-May-12	Should the following US/DS ratios be supported: • Mandatory from 10/90 to 50/50 • Optional: from 50/50 to 90/10?	2012-05-4A-033

New Item Number	Status	Item Description	Reference(s)
2.6.3	Agreed 12-Sept-11	that MIB elements shall be specified to allow the network operator to manage US and DS data rates independently on a per-line basis by Dynamic Line Management to provide service stability, the managed rates being less than or equal to maximum achievable rates discovered automatically during training and limited by the asymmetry defined by network management.	11GS3-087
2.6.4	Agreed 14-Dec-11	that G.fast shall support adjustment of the TDD US/DS asymmetry ratio under management control on a per dp basis, at least through an initialization of the dp?	C1899
2.6.4.1	Open 14-Dec-11	Should G.fast support seamless changes to the TDD US/DS asymmetry ratio on a per dp basis?	discussion
2.6.4.2	Open 22-Feb-12	Should achieving low complexity have higher priority than the benefits of dynamic asymmetry ratio?	2012-02-4A-020R1, 2012-05-4A-044
2.6.4.3	Open 22-Feb-12	If dynamic modification of asymmetry ratio is supported, should a normative control parameter be provided to set rate caps in each direction for the eventuality of over subscription by aggregate DS+US best effort traffic?	2012-02-4A-020R1, 2012-05-4A-044
2.7		**Powering**	(2012-02-4A-058)
2.7.1	Open 4-Aug-11	Should G.fast support a locally powered configuration?	11TC1-Verizon1
2.7.2	Open 7-May-12	Should G.fast define the functionalities necessary to support reverse powering protocol(s)?	2012-05-4A-033
2.7.2.1 (formerly 2.7.2)	Open 12-Sept-11	Should reverse powering be supported with a single CPE being able to power the node when all other CPEs are inactive?	11GS3-024, 2012-02-4A-040, 2012-05-4A-046
2.7.2.2 (formerly 2.7.2.1)	Open 22-Feb-12	Should power feeding be shared amongst all CPEs fairly?	2012-02-4A-040, 2012-05-4A-046
2.7.3	Agreed 12-Sept-11	that the target transceiver power consumption should be < 1W per active port.	11GS3-024, 2012-05-4A-033
2.7.3.1	Open 7-May-12	Should the power per active port be less than 1 watt for mature implementations < 1 mW / Keep-Alive *< 100 µW / powered down* Where power must scale near linearly with: • number of powering customers, • traffic demand? Note: ‘keep-alive’ means G.fast transceiver provisioned for service without customer traffic; ‘powered down’ means not G.fast transceiver provisioned for service.	2012-05-4A-033
2.7.4	Open 12-Sept-11	Should ports that are not active only contribute marginally (<0.2W) to the overall power consumption?	11GS3-024, 2012-02-4A-037, 2012-05-4A-033
2.7.5	Open 05-Dec-11	Should G.fast define a line status parameter at the FTU-O for unpowered lines?	C1899, 2012-02-4A-020R1, 2012-05-4A-044
2.7.6	Open 22-Feb-12	Should G.fast support remote powering from the CO (RFT-V, RFT-C)?	2012-02-4A-037
2.8		**EMC**	
2.8.1	Agreed 12-Sept-11	that G.fast shall support frequency notching in order to protect existing services if required.	11GS3-024, 2012-05-4A-033
2.8.1.1	Open 05-Dec-11	Should G.fast design take into account RFI ingress from non intentional and intentional radiators	C1899, 2012-02-4A-020R1

New Item Number	Status	Item Description	Reference(s)
2.8.2	Agreed 12-Sept-11	that, within its operating bandwidth, G.fast shall have a general purpose notching facility capable of notching the HF Broadcast, VHF band II (FM Broadcast), DAB Broadcast, and amateur radio allocations and in general protect public safety services and aeronautical and radio astronomy services .	11GS3-087
2.8.2.1	Open 12-Sept-11	Should G.fast also have the ability to dynamically notch the HF, VHF and DAB bands?	11GS3-087
2.8.2.2	Agreed 14-Dec-11	that G.fast shall be able to support notching of frequencies as required to meet regulatory emission requirements.	C1899
2.8.2.3	Open 05-Dec-11	Should it be possible to notch individual VHF FM carriers, DAB multiplexes, or narrow band channels, if required, driven by a postal-code data base?	C1899, 2012-02-4A-020R1, 2012-05-4A-044
2.8.3	Agreed 12-Sept-11	that G.fast should offer high immunity to REIN, PEIN, and Broadcast RFI ingress.	11GS3-087
2.8.4	Open 12-Sept-11	Should G.fast offer high immunity to Broadcast RFI ingress suffering aircraft flutter and under conditions of high band occupancy due to sporadic E layer propagation?	11GS3-087
2.8.4.1	Open 05-Dec-11	Should enhanced propagation modes such as Sporadic E be considered when estimating worst case RF ingress levels. For instance the VHF FM band may sometimes be almost filled with distant broadcasts in summer months. Sporadic E can be expected to lift DAB broadcasts as well. Long distance RF ingress may also be subject to flutter due to reflections from aircraft?	C1899, 2012-02-4A-020R1, 2012-05-4A-044
2.8.5	Open 22-Feb-12	Should G.fast be compliant with EMC standards and frequency regulation (frequencies up to 300 MHz)?	2012-02-4A-040, 2012-05-4A-046
2.9		**Coexistence with other access technologies**	
2.9.1	Open 12-Sept-11	Should support of DPBO up to 30 MHz in order to provide spectrum compatibility to VDSL2 be required?	11GS3-024
2.9.2	Agreed 12-Sept-11	that G.fast shall support start frequencies for data transmission of 17.664 and 30 MHz in order to be able to coexist with legacy services in the same cable plant, and operate above VDSL2.	11GS3-087, 2012-05-4A-033
2.9.2.1	Open 05-Dec-11	Should the start frequency be programmable at least from 17.664 MHz to at least 52.993 MHz in steps not larger than 2.208 MHz?	C1899, 2012-02-4A-020R1, 2012-05-4A-044
2.9.2.2	Open 05-Dec-11	Should the minimum frequency utilised by G.fast be programmable to avoid interference into ADE17 profile VDSL2 passing through the same DP. (LLU regulation requires that ADSL2plus and VDSL2 services may be deployed on adjacent pairs.)?	C1899, 2012-02-4A-020R1, 2012-05-4A-044
2.9.2.3	Agreed 10-May-12	that G.fast shall specify PSD masks controllable via MIB to allow spectral compatibility with xDSL services (ADSL2plus, all VDSL2 profiles) Implementations may support one or more of these masks.	2012-02-4A-037, 2012-05-4A-033
2.9.2.4	Open 22-Feb-12	Should a flexible start frequency from 0 Hz to 30 MHz be supported to protect legacy DSL systems?	2012-02-4A-040, 2012-05-4A-046
2.9.3	Open 7-May-12	Should G.fast support coexistence with POTS?	2012-05-4A-033
2.10		**QoS/QoE**	
2.10.1	Open 12-Sept-11	Should G.fast provide QoS and QoE for simultaneous TV, Music, Games, Telephony and Fast Internet, with MTBE better than 14400 seconds (see G.998.4) and one way latency less than 1 ms with no retransmissions?	11GS3-087

New Item Number	Status	Item Description	Reference(s)
2.10.2	Open 05-Dec-11	Should G.fast support QoS and QoE for simultaneous TV, Music, Games, Telephony and Fast Internet?	C-1899, 2012-02-4A-020R1
2.10.3	Agreed 14-Dec-11	that G.fast should have a latency of less than 1 ms per direction between the gamma reference points for a packet size of 64 bytes, when there are no retransmissions.	C-1899, 2012-05-4A-044
2.10.4	Open 22-Feb-12	Should G.fast be required to have a latency of less than 1 ms per direction between the gamma reference points when there are no retransmissions?	2012-02-4A-020R1, 2012-05-4A-033
2.10.5	Open 22-Feb-12	Should G.fast have a latency of less than 3 ms per direction between the gamma reference points, when there is no more than 1 retransmission?	2012-02-4A-020R1, 2012-05-4A-033, 2012-05-4A-044
2.10.6	Open 7-May-12	When isolated error bursts are corrected by retransmission, should the Peak Packet Delay be less than 3 ms + the length of the noise burst?	2012-05-4A-033
2.11		**Legacy interworking/seamless migration**	
2.11.1 (formerly 6.1.3)	Open 12-Sept-11	Should the specification of modes for backwards compatibility be defined as new options for G.992.3, G.992.5, and G.993.2?	11GS3-063
2.11.2	Open 3-Nov-11	Should the G.fast remote node provide interworking with legacy ADSL2/ADSL2plus and VDSL2 CPEs?	11RV-047
2.11.2.1	Open 3-Nov-11	Should G.fast, when operating in DSL mode, allow for sub-optimal performances compared to standards compliant, ADSL2/ADSL2plus or VDSL2 implementations?	11RV-047
2.11.3	Agreed 4-Nov-11	that G.fast should be specified so as to facilitate the implementation of legacy VDSL2 and ADSL2/2plus functionality (or a sub-set thereof) on the underlying hardware platform.	11RV-052, 2012-06-4A-021
2.11.3.1	Agreed 4-Nov-11	that this support of legacy functionality is intended for the FTU-O (network side), not for the FTU-R (user side).	Discussion
2.11.3.1.1	Open 22-Feb-11	Should agreed issue 2.11.3.1 be reworded as “That this support of legacy functionality is primarily intended for the FTU-O (network side), but support by the FTU-R should optionally be possible as well.”?	2012-02-4A-037
2.11.3.2	Agreed 13-Dec-11	If a VTU-O (VDSL2) transceiver is implemented on the underlying hardware platform for G.fast, it should be able to achieve the following data rates on a 50m PE04 loop with 3 self disturbers as crosstalkers: • at least 90 Mbit/s in the downstream direction and 50 Mbit/s in the upstream direction with 30a profile (B8-13 PSD mask); • at least 65 Mb/s in the downstream direction and 30 Mb/s in the upstream direction with 17a profile (B8-11 PSD Mask).	C1806R1
2.11.4	Open 22-Feb-12	If a VTU-O (VDSL2) transceiver is implemented on the underlying hardware platform for G.fast, Should it support VDSL2 vectoring?	2012-02-4A-037, 2012-05-4A-020
2.12		**OAM and diagnostics**	
2.12.1	Open 22-Feb-12	Should a loss of power (dying gasp) be supported at the network management interface when the last user leaves?	2012-02-4A-040, 2012-05-4A-046
2.12.2	Open 22-Feb-12	Should G.fast support MELT capabilities according to ITU-T G.996.2?	2012-02-4A-040, 2012-05-4A-046
3.		**Definitions and abbreviations**	

New Item Number	Status	Item Description	Reference(s)
3.1	Open	Should G.fast specify the Terms and Acronyms tables as begun in 11BM-073 and maintain them moving forward?	11BM-073
3.2	Open 18-June-12	Should the terms 'port', 'module' and 'node' be defined as proposed in 2012-06-4A-039?	2012-06-4A-039
4.		**Wiring topologies and reference loops**	(C-1403), (11BM-047)
4.1	Agreed 24-June-11	to adopt the modified star wiring topology and the distributed wiring topology as shown in Figures 3 and 4 of 11BM-022R1.	11BM-022R1, 11GS3-100
4.2	Open 18-April-11	Should G.fast support two performance options: 1) where the drop wire connects to the CPE at the NID or the wiring closet, and the CPE connects to the house wiring, and 2) where the drop wire connects directly to the house wiring?	11BM-022R1
4.4	Open 20-June-11	Should G.fast specify the Reference Points as depicted in Figure 5 of 11BM-072 for the Loop?	11BM-072
4.5	Open 20-June-11	Should G.fast specify the Reference Points as depicted in Figure 6 of 11BM-072 for in-home?	11BM-072
4.7	Agreed 24-June-11	To adopt the loop topologies, segment lengths, self-crosstalkers, and wire types proposed in the 'reference loops' section of 11BM-064R4.	11BM-064R4, 11TC1-BT2, 11TC1-BT3, 11GS3-100
4.7.1	Agreed 24-June-11	To adopt an additional loop topology of a straight loop of variable length (20 to 200 meters) of .5mm, for use with no crosstalk.	Discussion, 11GS3-100
4.7.2	Agreed 4-Aug-11	that the Reference Loops as drawn in Figure 1 through Figure 4 of 11TC1-Ikanos1R1 shall be adopted as working text in G.fast.	11TC1-Ikanos1R1, (11GS3-081), 11GS3-100
4.7.2.1	Agreed 4-Aug-11	that a specific reference to each of the cable types identified in the Reference Loops shall be provided so that proper simulation models can be implemented.	11TC1-Ikanos1, 11GS3-029, (11RV-020), (11RV-022), 2012-02-4A-029
4.7.2.1.1	Open 4-Aug-11	What are the references to the cable models for the following cable types in the Final Drop portion of the reference loops: A26u (26 AWG PIC buried cable), A26j (26 AWG loose jumper wire), A24u (24 AWG PIC buried cable), B05a (0.5 mm 2-pair unshielded aerial cable), and B05u (0.5 mm unshielded underground cables)?	11TC1-Ikanos1
4.7.2.1.2	Open 4-Aug-11	What are the references to the cable models for the following cable types in the In Premises Wiring portion of the reference loops: CAT3 (24 AWG Category-3), CAT 5 (24 AWG Category-5), B05cw (0.5mm unshielded untwisted cable)?	11TC1-Ikanos1
4.7.2.1.3	Agreed 28-Feb-12	that a new wire type "T05b" (for in-building cable) shall be added to Table 4 in the working text on Wiring topologies and reference loops.	11GS3-029 11RV-021, 2012-02-4A-030
4.7.2.1.4	Agreed 28-Feb-12	that a new wire type "T05h" (for in-house cabling) shall be added to Table 4 in the working text on Wiring topologies and reference loops	11GS3-029 11RV-021, 2012-02-4A-030
4.7.2.1.5	Agreed 28-Feb-12	to adopt the additional reference loops described in section 3 in 11RV-021.	11RV-021, 2012-02-4A-030, 2012-06-4A-037
4.7.2.1.7.1	Agreed 10-May-12	that the cable model for G.fast agreed in issue 5.1.1.1shall be modified according to 2012-05-4A-047R1, including a third parameter q_c.	2012-05-4A-047R1

New Item Number	Status	Item Description	Reference(s)
4.8	Agreed 12-Sept-11 Revised 7-May-12	To adopt 2012-05-4A-060 as baseline text for wiring topologies and reference loops.	11GS3-100R1, 11RV-071, 2012-05-4A-060
4.9	Agreed 18-June-12	that the model and parameter values in §3 of 2012-06-4A-036 shall be adopted for the wire type models T05b and T05h in the text for wiring topologies and reference loops (2012-05-4A-060).	2012-02-4A-030 2012-05-4A-060 2012-06-4A-036
5.		**Channel characteristics and performance studies**	(11BM-048), (11RV-020), (11RV-022), (11RV-027), (11RV-031), (11RV-051), (11RV-054), (11RV-063R1), (C1634R1), (C1864R1), (2012-02-4A-029) , (2012-02-4A-043)
5.1	Agreed 24-June-11	that models of wideband wire characteristics and crosstalk behaviour for loop segments within a twisted pair cable topology shall be developed for the purpose of: (a) performance studies for G.fast, and (b) future testloop specifications.	11BM-020, 11BM-021, (11GS3-028)
5.1.1	Open 12-Sept-11	Should the parametric models proposed in section 2 of 11GS3-029 be included in G.fast for defining two-port reference models of loop sections for (a) performance studies for G.fast and (b) future test loop specifications for G.fast?	(11GS3-028), 11GS3-029, (11RV-024)
5.1.1.1	Agreed 12-Sept-11	To adopt the parametric models proposed in section 2 of 11GS3-029 for CAT5 and T05u wiring types.	11GS3-029
5.1.2	Open 12-Sept-11	Should the parameter values proposed in section 3 of 11GS3-029 be included in G.fast to define two-port reference models of loop sections for (a) performance studies for G.fast and (b) future test loop specifications for G.fast?	(11GS3-028), 11GS3-029
5.1.2.1	Agreed 12-Sept-11	To adopt the parameter values proposed in section 3 of 11GS3-029 for CAT5 (entry 1 in the table) and T05u (entry 4 in the table).	11GS3-029
5.1.3	Open 12-Sept-11	Should additional parametric two-port models of cables sections for inclusion in G.fast be required to predict real impulse responses?	(11GS3-028), 11GS3-029
5.1.4	Open 12-Sept-11	Should the validation of additional sets of parametric values for two-port models of cables sections for inclusion in G.fast be required to be demonstrated via measurements?	(11GS3-028), 11GS3-029
5.1.5	Open 5-Oct-11	Should the cable model for B05 and B05u be the extrapolated TP100 model from TS 101-270-1?	11RV-026
5.1.6	Agreed 5-Oct-11	that the cable model for B05a shall be CAD55[1] from 11RV-026R2	11RV-026R2
5.2	Open 20-June-11	Should a disturber model as depicted in Figure 1 of 11BM-074 be considered as a foundation for analyzing the needs for G.fast noise and interference mitigation?	11BM-074, (2012-05-4A-021)
5.2.1	Open 5-Oct-11	Should an enhanced parametric model for FEXT be included in G.fast for use as reference model for predicting crosstalk?	11RV-023, (11RV-022), (2012-06-4A-033), (2012-06-4A-041)

New Item Number	Status	Item Description	Reference(s)
5.2.1.1	Open 5-Oct-11	Should the parametric model for FEXT, as proposed in section 2 of 11RV-023, be included in G.fast as a first-order enhancement until further enhancements are discovered?	11RV-023 (11RV-022)
5.2.1.2	Agreed 28-Feb-12	that a parametric model for FEXT shall include dual slope behavior of the EL-FEXT factor, by means of either a second order transfer function or a piecewise linear function.	2012-02-4A-038
5.2.2 (formerly 5.3)	Open 4-Aug-11	Should the FEXT be modelled in the upstream direction by considering that the in house-wiring of the disturbers does not include bridged taps?	11TC1-Broadcom1
5.2.3	Agreed 18-June-12	that FEXT models should relate also to scenarios where the loops in a binder have different attenuation, which may result in FEXT imbalance gain.	2012-06-4A-029
5.4	Agreed 13-Sept-11 Revised 5-Oct-11	to the following items regarding the framework for simulations to be done after the G.fast environmental requirements are defined: • On the primary reference 0.5 mm loop, we use reference loop lengths of 200 m, 100 m and 50 m for which objective bit rates shall be determined without crosstalk and with crosstalk as defined in Issue 5.4.2, and • For the star topology, we define reference coupling lengths of 1 m, 10m and 50 m with crosstalk in the reference coupling lengths as defined in Issue 5.4.2, where the total loop length is 200 m, 100 m and 50 m (9 test cases). • Wiring type shall be B05a, CAD55[1] from 11RV-026R2.	11GS3-075
5.4.1	Agreed 13-Sept-11 Revised 5-Oct-11	That reporting of the results for the test cases in Issue 5.4 shall include: • Achievable bit rate vs electrical loop length (loss at 100 MHz into 100 Ohms). • Maximum frequency for loading 1 bit per sub-carrier, With start frequencies of 12, 17 and 30 MHz, -140 and -150 AWGN, and PSD level of -76 dBm/Hz flat, coding gain = 5 dB and margin = 6 dB.	11GS3-075
5.4.2	Agreed 5-Oct-11	that the basic FEXT crosstalk model shall be as specified in T1.417 section A.3.2.2 with N=1 (single disturber), and L the reference coupling length according to Issue 5.4. In addition, crosstalk offsets of +6 dB and – 6 dB shall be used.	discussion
5.4.3	Agreed 18-June-12	that G.fast performance (and VDSL2 fallback performance) should be evaluated for loop lengths up to at least 400m of CAD55-1. Note: This is for information purposes only, and does not impact the current agreements pertaining to operating loop length (Issue 2.3.4.1, 2.3.5).	2012-06-4A-020
5.4.4	Closed	Should the performance of VDSL2 emulated with G.fast in multimode operation be evaluated for loop lengths up to at least 400m? • See Issue 5.4.3	2012-06-4A-020
5.5	Agreed 13-Sept-11	that G.fast performance shall be evaluated using at least the final drop and in-premises wiring models identified in 11GS3-087.	11GS3-087
6.		**Technology**	
6.1		**General**	(C-1242), (C-1489), (11BM-028)

New Item Number	Status	Item Description	Reference(s)
6.1.1	Open 20-June-11	Should tables such as those depicted in 11BM-075 (Tables 1, 2, 3, 4, & 5) be used for organizing the analysis of comparing VDSL2 and G.hn derivatives as candidate technologies to base G.fast on?	11BM-075
6.1.2	Open 14-Feb-11	Should the FTTdp access solution be based on the G.hn standard?	C-1460, 11BM-070
6.1.5	Agreed 12-Sept-11 Revised 7-May-12	that G.fast shall utilise retransmission below the gamma reference point as the primary protection against REIN and PEIN.	11GS3-079, 2012-05-4A-052
6.1.5.1	Open 7-May-12	Should requirements for the G.fast retransmission mechanism be developed	2012-05-4A-052
6.1.5.2	Agreed 22-June-12	that an automatic repeat-request (ARQ) mechanism shall be defined in G.fast with the aim to correct errored packets by means of retransmission.	2012-05-4A-056
6.1.5.3	Agreed 22-June-12	Should the ARQ mechanism operate under the following basic requirements: 1. For the purposes of ARQ, the transmit data at the selected reference point is divided into DTUs. 2. Each DTU: - is associated with a sequence number; - includes means for detection of errored DTU; 3. The receiver should acknowledge as soon as possible all the relevant previously received and processed DTUs: errored, not identified, or correctly received. NOTE: This list of requirement doesn't prevent more requirements to be added.	2012-05-4A-056
6.1.5.4	Open 18-June-12	Should G.fast specify an Incremental Redundancy Hybrid Automatic Repeat reQuest (IR-HARQ) scheme?	2012-06-4A-042
6.1.5.5	Open 18-June-12	Should the IR-HARQ scheme facilitate also independent decoding of a retransmitted frame (ID-IR-HARQ)?	2012-06-4A-042
6.1.5.6	Open 18-June-12	Should G.fast specify synchronous retransmission mechanism	2012-06-4A-043
6.1.5.7	Open 18-June-12	Should retransmission ACK/NACK message be transmitted in a known position in the frame	2012-06-4A-043
6.1.5.8	Open 18-June-12	Should retransmission offset from the start of frame be supported	2012-06-4A-043
6.1.5.9	Open 18-June-12	Should G.fast utilize a type II HARQ retransmission scheme with soft ACK?	2012-06-4A-061
6.1.8	Open 3-Nov-11	Should the shared architecture shown in Figure 2 of 11RV-062R1 be supported in the G.fast Recommendation?	11RV-061, 11RV-062R1, (2012-02-4A-044)
6.1.8.1	Open 3-Nov-11	Should a TDMA protocol be supported in the G.fast Recommendation?	11RV-061, 11RV-062R1, (2012-02-4A-044)
6.1.10	Open 7-May-12	Should modulation and coding proposals be evaluated at least according to the criteria in 2012-05-4A-051?	2012-05-4A-051
6.2		**PHY layer**	
6.2.1		**Modulation**	

New Item Number	Status	Item Description	Reference(s)
6.2.1.1 (formerly 6.2.1)	Agreed 24-June-11	that G.fast shall adopt OFDM with cyclic extension as the modulation scheme. NOTE: DMT is considered as OFDM	11BM-070
6.2.1.1.1	Open 22-Feb-12	Should G.fast adopt the modulation method detailed in G.993.2?	2012-02-4A-034
6.2.1.2	Open 22-Feb-12	Should G.fast specify N=2048 sub-carriers for operation using bandwidth of 100 MHz?	2012-02-4A-050
6.2.1.3	Open 7-May-12	Should G.fast use the method in Figure 1 of 2012-05-4A-028 to define a DMT symbol?	2012-05-4A-028
6.2.1.4	Open 7-May-12	Should G.fast define an IFFT/FFT size of N=4096?	2012-05-4A-035
6.2.1.5	Open 7-May-12	Should G.fast specify a variable cyclic prefix length up to 2.0 µs?	2012-05-4A-053
6.2.1.6	Open 7-May-12	Should G.fast specify, as an option, transmission of pilot tones in the downstream direction (to simplify CPE clock synchronization)?	2012-05-4A-057
6.2.1.7	Agreed 10-May-12	that G.fast shall not load sub-carriers below 2.2 MHz.	discussion
6.2.1.8	Agreed 9-May-12	that the tone spacing shall be a multiple of 4.3125 kHz. The only tone spacing values to be considered are 6*4.3125kHz, 8*4.3125kHz and 12*4.3125kHz	2012-05-4B-061
6.2.1.9	Agreed 10-May-12	that the cyclic extension length shall be in the form of m*N/64 in reference samples at 2*N*delta_f Hz. N is the number of sub-carriers, delta_f is the sub-carrier, and m is an integer. The range of valid m values is TBD. It is preferable that valid values of m are only even.	2012-05-4B-063, (2012-06-4A-054R1)
6.2.1.10	Open 18-June-12	Should the G.fast symbol time be approximately 20µsec (19.324µsec without CP)?	2012-06-4A-032R1
6.2.1.11	Agreed 20-June-12	that, for operation in G.fast mode, the maximum number of bits per sub-carrier shall be 12.	2012-06-4A-053
6.2.2		**Bandwidth and profiles**	
6.2.2.2 (formerly 6.2.4)	Open 4-Aug-11	Should the upper frequency limit of the G.fast band be at least 250 MHz	11TC1-BT1, 2012-05-4A-033
6.2.2.3	Open 7-May-12	Should G.fast define a 200MHz profile as one of its operating modes?	2012-05-4A-033
6.2.2.4	Open 7-May-12	Should G.fast adopt tone number 2048 or 1024 for profile using the bandwidth of 105.984 MHz?	2012-05-4A-028
6.2.2.5	Open 7-May-12	Should G.fast adopt four different profiles with highest frequency 3, 6, 9, and 12 times 17.664 MHz, the highest frequency of VDSL2's 17a profile?	2012-05-4A-028
6.2.2.6	Open 7-May-12	Should G.fast use the frequency band up to 150MHz?	2012-05-4A-041
6.2.2.7	Agreed 10-May-12	That G.fast shall define the protocol up to 200MHz with initially one profile up to approximately 100 MHz. The protocol shall define all valid parameter values to support 200MHz. The 100MHz profile shall restrict the subset of those valid parameter values.	2012-05-4A-063
6.2.3		**UPBO**	
6.2.3.1 (formerly 6.2.3)	Open 4-Aug-11	Should G.fast specify a mechanism to allow upstream power back-off for non co-located topologies?	11TC1-Broadcom1

New Item Number	Status	Item Description	Reference(s)
6.2.3.1.1 (formerly 6.2.3.1)	Open 4-Aug-11	Should G.fast specify the same upstream power back-off mechanism(s) as VDSL2?	11TC1-Broadcom1
6.2.4		**Duplexing method**	
6.2.4.1 (formerly 6.1.6)	Agreed 4-Nov-11	that the duplexing method for G.fast shall be Time Division Duplexing.	11GS3-083, (11RV-025), 11RV-029, 11RV-038, 11RV-050, 11RV-058, (C1872R1), (C1875), (C1898R1)
6.2.4.1.1	Closed	Should a G.fast TDD have a frame and super-frame structure?	11RV-038, C1811R1
6.2.4.1.2	Open 3-Nov-11	Should a G.fast TDD frame size be approximately 750 µs?	11RV-038, C1811R1
6.2.4.1.3	Open 3-Nov-11	Should a G.fast TDD super frame length be of the order 32 to 64 frames?	11RV-038, C1811R1
6.2.4.1.5	Open 7-Dec-11	Should the line code sampling rate be a multiple of 35328 kHz?	C1811R1, 2012-05-4A-028
6.2.4.1.6	Open 7-Dec-11	What should be the FFT size?	C1811R1
6.2.4.1.6.1	Open 7-Dec-11	Should FFT size scale with sampling frequency to support full rate and half full rate instances?	C1811R1
6.2.4.1.7	Open 7-Dec-11	What should be the Cyclic Extension size?	C1811R1, (2012-05-4A-034)
6.2.4.1.7.1	Open 7-Dec-11	Should Cyclic Extension scale with sampling frequency?	C1811R1
6.2.4.1.7.2	Open 22-Feb-12	Should the G.fast frame structure be defined to enable in-traffic reconfiguration to change the OFDM/DMT cyclic prefix?	2012-02-4A-051
6.2.4.2 (formerly 6.1.6.1)	Agreed 12-Sept-11	To a goal to make a decision on the duplexing method to be specified in G.fast no later than the November 2011 Q4/15 meeting.	11GS3-083
6.2.4.2.1	Agreed 4-Nov-11	that the driving reason(s) for selection of the duplexing method in relation to the driving operator requirements shall be documented as Appendix I to this Issues List.	11RV-050
6.2.4.2.1.1	Agreed 4-Nov-11	To adopt the text from §3 of 11RV-050 as a starting point for this Appendix. (Note: Editor will review other contributions and propose further text)	11RV-050
6.2.4.2.2	Open 3-Nov-11	In order to decide on TDD or FDD for G.fast, should it be: • specified if G.fast should support backward compatibility to G.992.3, G.992.5, and G.993.2, • specified if G.fast should operate in an unbundled environment, • investigated if the duplexing scheme has an impact on the round trip time, • specified if G.fast should support SELT?	11RV-055
6.2.5		**PHY layer distribution (P2P vs P2MP)**	
6.2.5.1 (formerly 6.1.7)	Open 5-Oct-11	Should the point-to-multipoint architectures shown in Figures 3 and 4 of 11RV-028 be supported in the G.fast Recommendation?	11RV-028, 2012-02-4A-036, (2012-02-4A-044)

New Item Number	Status	Item Description	Reference(s)
6.2.5.2	Open 3-Nov-11	Should G.fast define operation in a point-to-point configuration with an initialization procedure for training of the transceivers together with an efficient frame structure for providing optimum throughput?	11RV-052, 2012-02-4A-036
6.2.5.3	Open 3-Nov-11	Should G.fast utilize point-to-point architecture?	11RV-053, C1868R1, 2012-02-4A-036, 2012-02-4A-037, (2012-02-4A-044)
6.2.5.4	Open 7-May-12	Should G.fast support a common architecture approach that supports over subscription of DSP resource and zero touch OAM?	2012-02-4A-036, 2012-05-4A-037
6.2.5.4.1	Open 7-May-12	Should the G.fast Protocol support multiple multi-line modules at the DP?	2012-02-4A-036, 2012-05-4A-037
6.2.5.4.2	Open 7-May-12	Should the G.fast Protocol support implementations with more user ports than transceiver DSP channels?	2012-02-4A-036, 2012-05-4A-037
6.2.6		**FEC**	
6.2.6.1	Open 22-Feb-12	Should LDPC be specified as the FEC coding method for G.fast?	2012-01-4A-055, 2012-05-4A-054
6.2.6.1.1	Open 22-Feb-12	Should the LDPC support multiple coding rates and big block size to cope with challenging noise environment of G.fast?	2012-01-4A-055, 2012-05-4A-054
6.2.6.1.2	Open 7-May-12	Should the QC-LDPC-BC code described in section 3 of 2012-05-4A-054 be specified as the FEC method for G.fast?	2012-05-4A-054
6.2.6.2	Agreed 2-Mar-12	that full proposals for FEC should be submitted no later than the May 2012 meeting with a goal to make a decision on the FEC no later than the August 2012 meeting.	discussion
6.2.6.3	Open 7-May-12	Should BLER (and not BER) be used as a parameter to compare different FEC proposals?	2012-05-4A-054, 2012-06-4A-067
6.2.6.4	Open 7-May-12	Should the FEC scheme comply with the basic requirements presented in Table 2 of 2012-05-4A-058?	2012-05-4A-058
6.2.6.5	Agreed 10-May-12	to evaluate for inclusion in G.fast only the following 2 codes: • QC-LDPC-BC according to 2012-05-4A-054 • The trellis code of G.993.2 with the DTU structure as defined in G.998.4 (Reed Solomon + block interleaving) with a goal to reach a decision at the August 2012 Q4a/15 meeting on which one of these to specify in G.fast.	discussion
6.2.6.6	Agreed 31-May-12	to first perform simulations as detailed in 2012-06-4A-0xx (report of the May 31 teleconference call) as a calibration exercise.	2012-06-4A-0xx, (2012-06-4A-055), (2012-06-4A-065R1), (2012-06-4A-066R1)
6.2.6.7	Agreed 21-June-12	That, If the LDPC code of G.9960 is selected as the FEC code for G.fast, the odd-constellation mapping of G.fast, if specified, shall be the odd constellation of G.9960 with the modification described in the §3 of 2012-06-4A-056.	2012-06-4A-056
6.2.6.8	Open 18-June-12	Should the comparison between the FEC schemes selected in the agreement 6.2.6.5 be based on the criteria described in contribution 2012-06-4A-067?	2012-06-4A-067
6.2.7		**PSD**	
6.2.7.2	Agreed 22-June-12	that the generic format of the out-of-band PSD definition shall be as proposed in §2.1 of 2012-06-4A-026R4.	2012-06-4A-026R4
6.2.7.2.1	Agreed 20-June-12	that the high-frequency out-of-band PSD shall comply with the values defined in Table 1 of 2012-06-4A-026R2.	2012-06-4A-026R2

New Item Number	Status	Item Description	Reference(s)
6.2.7.2.2	Agreed 20-June-12	that the low-frequency out-of-band PSD shall comply with the values defined in Table 2 of 2012-06-4A-026R2.	2012-06-4A-026R2
6.2.7.2.3	Agreed 22-June-12	that the text presented in §3 of 2012-06-4A-026R4 shall be adopted into the draft G.fast Recommendation as working text for a specification of the out-of-band requirements.	2012-06-4A-026R4
6.2.8		**Tx power**	
6.2.8.1	Agreed 20-June-12	that the upper bound of the aggregate transmit power limit of a 100 MHz profile G.fast shall be 4.0 dBm in both upstream and downstream while transmitting.	2012-06-4A-047R2
6.2.8.1.1	Agreed 20-June-12	that the working text proposed in §3 X.2 of 2012-06-4A-047R2 defining G.fast aggregate transmit power shall be adopted.	2012-06-4A-047R2
6.2.9		**Termination impedance**	
6.2.9.1	Agreed 20-June-12	that a 100 Ohm termination impedance shall be used to evaluate transmit PSD and transmit power for both FTU-O and FTU-R. NOTE: This agreement doesn't imply any specific value of the FTU-O or FTU-R impedance.	2012-06-4A-047R2
6.2.9.1.1	Agreed 20-June-12	that the working text proposed in §3 X.1 of 2012-06-4A-047R2 defining G.fast termination impedance shall be adopted.	2012-06-4A-047R2
6.3		**MAC layer/PMS-TC**	
6.3.1	Open 20-June-11	Should a 'TDMA only' based MAC be specified for G.fast?	11BM-070, 2012-02-4A-036
6.3.2	Open 20-June-11	Should G.fast specify a level of Layer 2 security, as discussed in 11BM-076?	11BM-076
6.3.3	Open 22-Feb-12	Should G.fast specify a unified TDD frame and superframe structure capable of supporting crosstalk avoidance by DVSTDMA?	2012-02-4A-036
6.3.3.1	Open 22-Feb-12	Should G.fast specify a DVSTDMA protocol at the U reference point?	2012-02-4A-036, 2012-05-4A-022R2
6.3.3.2	Open 22-Feb-12	Should the minimum DVSTDMA vector group size be 4?	2012-02-4A-036
6.3.3.3	Open 22-Feb-12	Should both DVSTDMA and VTDD be mandatory capabilities of the FTU-R?	2012-02-4A-036
6.3.3.4	Open 22-Feb-12	Should DVSTDMA at the FTU-O be an optional capability in equipment placed on the market before December 2014 after which it becomes a mandatory capability?	2012-02-4A-036
6.3.4	Open 22-Feb-12	Should the TDD frame consist of two time-slots containing multiple OFDM symbols (one upstream and one downstream) where those time-slots shall be used simultaneously by all lines?	2012-02-4A-045

New Item Number	Status	Item Description	Reference(s)
6.3.5	Open 22-Feb-12	Should the G.fast duplexing method be based on the following principles: 1. The G.fast FTU-O will include 2 profiles: STDD (P2P) and STDMA (P2MP); compliance to G.fast requires implementation of either profile. 2. The G.fast FTU-R (CPE) shall be capable to support both profiles, while the FTU-O can be either STDD, or STDMA, or capable to do both. 3. A unified transmission format shall be defined for both transmission techniques; the STDD framing will be a subset of STDMA framing. 4. G.fast shall include means to support scalable power consumption (up and down) according to the throughput requirement, i.e. no unnecessary idle data transmission just to fill up the time allocation?	2012-02-4A-057
6.3.6	Open 22-Feb-12	Should the transmission format of G.fast accommodate both synchronized TDD (STDD) and synchronized TDMA (STDMA) modes of operation? NOTE: The STDD (also called P2P) and STDMA (also called P2MP) modes are as described in 11RV-062	11RV-062 2012-02-4A-054
6.3.6.1	Open 22-Feb-12	Should the transmission format of G.fast comprise superframes that: • follow one another continuously, with no gaps; • each start from a SyncSymbol followed by M symbol periods for data/management/control symbols • are each divided into groups of consecutive symbols; each group may be assigned for upstream or downstream transmission; • contain SyncSymbols that are always transmitted in the downstream and that may be transmitted in the upstream (if configured)?	2012-02-4A-054, 2012-05-4A-057
6.3.6.2	Open 22-Feb-12	Should superframes of all lines connected to a DP be aligned in time where: • superframes of all lines connected to a DP are aligned by downstream SyncSymbols (i.e., downstream SyncSymbols of all lines are aligned); • downstream symbols of all lines are aligned; • upstream symbols of all lines are aligned • - downstream transmission time slots over all lines be aligned; - upstream transmission time slots over all lines be aligned?	2012-02-4A-054, 2012-05-4A-057
6.3.6.3	Open 22-Feb-12	Should the order of transmission in upstream and downstream for the assigned groups of consecutive symbols (as per Issue 6.3.5.2) be determined by the medium access plan (MAP), where: • the MAP includes the schedule of all upstream and downstream transmissions (US/DS ratio) for all lines connected to a DP; • the MAP is generated and updated by the DP, and distributed to all CPEs connected to the DP; • both DP and any CPEs strictly comply with the US/DS ration and transmission timing defined in the MAP?	2012-02-4A-054, 2012-05-4A-057
(6.3.6.3.2)			
6.3.7	Open 7-May-12	Should G.fast use the same STDD frame structure in showtime and in initialization (except for G.994.1 handshake)?	2012-05-4A-027, 2012-06-4A-035

New Item Number	Status	Item Description	Reference(s)
6.3.8	Open 7-May-12	Should a mechanism be specified for G.fast transceivers to select common STDD frame parameters during G.994.1 handshake?	2012-05-4A-027, 2012-06-4A-035
6.3.9	Closed 18-June-12	Should an STDD frame consist of the following four segments: downstream time, upstream time, downstream-upstream guard time, and upstream-downstream guard time? • See Issue 6.3.25	2012-05-4A-027
6.3.9.1	Open 7-May-12	Should the parameters downstream-upstream guard time and upstream-downstream guard time be defined at the U-O interface?	2012-05-4A-027, 2012-06-4A-035
6.3.10	Open 7-May-12	Should the transmission format of G.fast comprise superframes where: • the super-frame length is fixed • superframes follow one another continuously, with no gaps; • Super-frame is built out of frames where the frame is the basic Down/Up duplexing element • All symbols in a super-frame have the same duration, which depends on the selected value of cyclic prefix? Super-frame may include various kinds of symbols like user data, control, management data, probing symbols, quiet symbols. The activation protocol for these symbols and their definition are for further study.	2012-05-4A-039
6.3.11	Open 7-May-12	Should superframes of all lines connected to a DP be aligned in time	2012-05-4A-039
6.3.12	Open 7-May-12	Should frames of all lines connected to a DP be aligned in time?	2012-05-4A-039
6.3.13	Open 7-May-12	Should frames be divided to 3 segments as follows: • Downlink only segment • Flexibly allocated segment for either Downlink or Uplink transmissions • Uplink only segment where the allocation of each frame to segments will be common to all the lines in the DP i.e., same lengths and synchronized?	2012-05-4A-039, 2012-06-4A-045
6.3.14	Open 7-May-12	Should, for every frame, the downlink only segment and the uplink only segment of all the lines connected to a DP be aligned in time?	2012-05-4A-039
6.3.15	Open 7-May-12	Should downlink frames include a length indicator indicating the downlink transmission length?	2012-05-4A-039, 2012-06-4A-045
6.3.16	Open 7-May-12	Should downlink frames include a length indicator holding the maximal downlink transmission length over the entire DP?	2012-05-4A-039, 2012-06-4A-044, 2012-06-4A-045
6.3.17	Open 7-May-12	Should each superframe include two types of training signals: • Fixed signals, present on every superframe • Dynamically activated signals?	2012-05-4A-040
6.3.18	Open 7-May-12	Should a downlink SyncSymbol be defined where: • the sync symbol is the first symbol in the Superframe • sync symbols of all the lines connected to a DP are aligned?	2012-05-4A-040

New Item Number	Status	Item Description	Reference(s)
6.3.19	Open 7-May-12	Should superframes include an extended preamble segment where: • extended preamble is transmitted right after the sync symbol • the extended preamble length holds fixed number of symbols • all extended preambles of lines in a DP are aligned in time • includes both uplink and downlink parts, both of fixed (TBD) duration?	2012-05-4A-040
6.3.20	Open 7-May-12	Should every downlink/uplink segment within a TDD frame start with a preamble to facilitate timing correction?	2012-05-4A-040, 2012-06-4A-030
6.3.20.1	Open 18-June-12	Should the preamble include both pilots and user data; one pilot over M (TBD) data carriers?	2012-06-4A-030
6.3.21	Open 7-May-12	Should superframes include probing mini-frame where: • the probing mini-frame is actived upon request via a management protocol • the probing mini-frame parameters are set dynamically, e.g., up/down transmission periods, which line is active and which line is quiet?	2012-05-4A-040
6.3.21.1	Open 18-June-12	Should G.fast specify a dedicated probing signal to facilitate channel estimation for vectoring?	2012-06-4A-031
6.3.21.2	Open 18-June-12	Should the channel estimation probing signal facilitate the estimation of multiple FEXT/direct channels by a given receiver using a single probing signal?	2012-06-4A-031
6.3.22	Open 7-May-12	Should the simple framer as described in 2012-06-4A-069 be used as a framework for G.fast framing?	2012-05-4A-042, 2012-06-4A-069
6.3.23	Agreed 9-May-12 Revised 21-June-12	that G.fast shall specify a superframe structure where: • the superframe consists of an integer number of contiguous TDD frames (sent with no gaps), which includes a delimiter to identify the boundary of the superframe, • The delimiter is transmitted by the FTU-O (sent in the downstream direction), • Superframes are all of the same length (in time). The length of the superframe is constant at least during a given showtime, • Superframes follow one another continuously, with no gaps, • Network timing reference (NTR), ToD, shall be supported (shall be taken in consideration for frame design), • Superframes transmitted by all FTU-Os of a coordinated group shall be aligned in time, and • Superframe delimiter symbols (in the downstream) of all lines shall be aligned at the U-O reference point	2012-05-4A-062R2, (2012-06-4A-063), 2012-06-4A-064
6.3.23.1	Closed	Should the superframe be an integer number of TDD frames (clarification to first bullet item in issue 6.3.23)? • See Issue 6.3.23	2012-06-4A-064
6.3.24	Agreed 9-May-12	that symbol alignment shall be specified such that: • downstream symbols transmitted by all FTU-Os of a coordinated group shall be aligned between themselves at the U-O reference point, and • upstream symbols transmitted by all FTU-Rs of a coordinated group shall be aligned between themselves at the U-O reference point.	2012-05-4A-062R2

New Item Number	Status	Item Description	Reference(s)
6.3.25	Agreed 9-May-12	that G.fast shall specify a frame structure where: • a TDD frame contains a block of downstream and a block of upstream symbol positions, • a TDD frame at the U-interface consists of a downstream transmission opportunity followed by a guard time period (no transmission) followed by an upstream transmission opportunity followed by a guard time period (no transmission), • the transmission opportunity (upstream or downstream) includes an integer number of symbol positions, • the size and variability of the guard time period is TBD, and • any transmission (upstream or downstream) includes an integer number of contiguous symbols (inside the transmission opportunity).	2012-05-4A-062R2, (2012-06-4A-063)
6.3.26	Agreed 9-May-12	that one or more reference symbols per superframe in the downstream and in the upstream directions shall be specified to facilitate downstream and upstream vectoring, respectively, where the reference symbols shall have the same positions in the superframe of all lines of a coordinated group. NOTE – This agreement doesn't imply that we shall use G.993.5 vectoring and doesn't limit the use of this symbol to vectoring only. It also doesn't imply that reference symbols in different lines of a coordinated group shall have the same content.	2012-05-4A-062R2
6.3.27	Open 9-May-12	Should means be developed to allow upstream transmission to start at any symbol position of an upstream transmission opportunity?	2012-05-4A-062R2
6.3.28	Open 9-May-12	Should the delimiter be carried at the first symbol position of the first TDD frame of a superframe?	2012-05-4A-062R2
6.3.29	Closed	Should the TDD frame duration be upper limited by 750µsec? • see Issue 6.2.4.1.2	2012-06-4A-032R1
6.3.30	Agreed 21-June-12	that TDD frames shall be aligned (i.e., start at the same time) across all lines in a coördinated group.	2012-06-4A-035
6.3.31	Open 18-June-12	Should G.fast define a dynamic bandwidth allocation (DBA) functionality that coordinates the downstream and upstream transmit opportunities over the coordinated group, where the allocation of downstream and upstream transmit opportunities may be static (i.e., constant over time as set by the ME) or may be dynamic (i.e., variable over time, depending on traffic needs and within bounds set by the ME)?	2012-06-4A-038, 2012-06-4A-051
6.3.31.1	Open 18-June-12	Should G.fast specify means to convey an upstream Dynamic Bandwidth Report (DBRus) from the FTU-R to the FTU-O, where the DBRs are conveyed as frequently as needed to meet QoS requirements?	2012-06-4A-038, 2012-06-4A-051
6.3.31.1.1	Open 18-June-12	Should the upstream Dynamic Bandwidth Report (DBRus) be an indication of the aggregate bandwidth need (1 number) or of the per-QoS-class bandwidth need (> 1 number)?	2012-06-4A-038, 2012-06-4A-051
6.3.32	Open 18-June-12	Should dynamic adaptation of the uplink/downlink transmission time be facilitated?	2012-05-4A-039 2012-06-4A-044
6.3.32.1	Open 18-June-12	Should dynamic adaptation be done in a managed manner, avoiding NEXT collisions? This does not preclude other schemes.	2012-05-4A-039 2012-06-4A-044
6.3.32.2	Open 18-June-12	Should downlink frames include a timing indicator, specifying the start location of the uplink transmission on the line (for the given line)?	2012-06-4A-044

New Item Number	Status	Item Description	Reference(s)
6.3.33	Open 18-June-12	Should a flexible frame structure be defined for G.fast that allows changing the allocation of US/DS timeslots dynamically?	2012-06-4A-061
6.3.34	Open 18-June-12	Should a flexible frame structure that enables in-frame HARQ with a second downstream time slot for the retransmission be defined for G.fast?	2012-06-4A-061
6.3.35	Agreed 21-June-12	that, if the specified number of sub-carriers is 2048, the total TDD frame period shall be an integer multiple of DMT symbol periods.	2012-06-4A-064
6.3.35.1	Open 18-June-12	Should the duration of the duration of the individual guard intervals T_{pd} and T_{g1} spanning a total guard interval time of $2{\times}T_{pd}+2{\times}T_{g1}$ be restricted to one or two symbol periods (TBD)?	2012-06-4A-064
6.3.36	Closed	Should the superframe for each of the upstream and downstream signals define a sync symbol; the details are to be determined? • See Issue 6.3.26	2012-06-4A-064
6.3.37	Open 18-June-12	Should an embedded operations channel (eoc) be defined within a superframe and corresponding TDD frames for support of operations, administration, and management functions during Showtime?	2012-06-4A-064
6.3.38	Open 21-June-12	Should G.fast define a mechanism to change the US/DS asymmetry ratio during Showtime without re-initializations?	discussion
6.4		**Low power modes**	
6.4.1	Agreed 21-June-12	that G.fast shall provide power savings based on discontinuous operation, where discontinous operation means that not all of the time available for data transmission is used.	11BM-035, 2012-05-4A-030, 2012-05-4A-038, 2012-05-4A-040
6.4.1.1	Open 20-June-11	Should G.fast provide a low power mode, a quiescent standby state with high power saving and rapid return to operation at rates suitable for VoIP?	11BM-035, 2012-05-4A-038
6.4.1.2	Open 20-June-11	Should the method for punctured G.fast operation be cyclic or stochastic?	11BM-035, 2012-05-4A-038
6.4.1.3	Open 3-Nov-11	Should G.fast support a life-line derived POTS service for an extended period working from batteries in the event of a power failure?	11RV-035, 2012-05-4A-038
6.4.1.3.1	Open 3-Nov-11	Should G.fast provide a special low power state (L2.4) to support a life-line derived POTS service when phones are “on-hook”, to provide a very low data rate for SIP and other critical “keep-alive” packets and very low power consumption state to preserve battery power?	11RV-035, 2012-05-4A-038
6.4.1.3.1.1	Open 3-Nov-11	In this state, should the link sustain coarse synchronisation to enable speedy re-establishment of a low rate QoS enabled channel for derived voice traffic?	11RV-035, 2012-05-4A-038
6.4.1.4	Open 3-Nov-11	Should G.fast permit the power consumption of transceivers to be approximately proportional to traffic demand?	11RV-035, 2012-02-4A-020R1, 2012-05-4A-038, 2012-05-4A-044
6.4.1.5	Open 7-May-12	Should G.fast define different levels of low power modes based on discontinuous operation as a function of maximum latency and recovery time?	2012-05-4A-030, 2012-06-4A-040
6.4.1.6	Open 7-May-12	Should different low power states be defined for G.fast?	2012-05-4A-042, 2012-06-4A-070
6.4.1.6.1	Open 7-May-12	Should low power states be implemented as described in 2012-05-4A-042?	2012-05-4A-042, 2012-06-4A-070
6.4.1.6.2	Open 18-June-12	Should a full power mode (L0) be defined for G.fast where idle pattern should be transmitted if there is no payload to fill up time slots (symbols)?	2012-06-4A-070

New Item Number	Status	Item Description	Reference(s)
6.4.1.7	Open 18-June-12	Should discontinuous operations be defined on a per TDD frame basis or on a per Superframe basis?	2012-06-4A-040
6.4.2	Open 7-Dec-11	Should G.fast use a multi-layer TCAM modulation as a low power mode, enabling power savings adaptive to user traffic?	C1938, 2012-02-4A-041
6.4.3	Open 22-Feb-12	Should a low power mode be defined that allows a line to be active only a subset of the allocated OFDM symbols when it's required net data rate is lower than the peak line rate?	2012-02-4A-045
6.5		**Reference models (functional, protocol)**	
6.5.1	Open 12-Sept-11	Should the G.fast Protocol Reference model be based on that for G.993.2 as modified in G.998.4?	11GS3-080
6.5.1.1	Open 12-Sept-11	Should G.fast define TPS-TC for Ethernet, RTX-TC, PMS TC and PMD layer functional requirements?	11GS3-080
6.5.1.2	Open 12-Sept-11	Should the retransmission protocol require flow control to the Transport Protocol Layer?	11GS3-080
6.5.2	Open 3-Nov-11	Should the G.fast Recommendation include an (informative) appendix describing functionality between the R/S and U reference points (i.e., functionality in the dp equipment)?	11RV-045
6.5.3	Open 3-Nov-11	Should G.fast transceivers located in a TR-156 GPON ONU be managed from the network side over GPON OMCI?	11RV-045
6.5.4	Open 7-May-12	Should Figure 1 shown in §2 of 2012-05-4A-026 be adopted as a reference model for a G.fast system?	2012-05-4A-026
6.5.4.1	Agreed 10-May-12 Revised 20-June-12	that the proposed text in §3 of 2012-06-4A-038R1 shall be adopted as working text associated with the reference model for a G.fast system.	2012-05-4A-026R1, 2012-06-4A-038, 2012-06-4A-051
6.5.5	Agreed 22-June-12	that G.fast shall specify a logical interface (see definition 3.29/G.993.2) at the γ-O and γ-R reference points. Note: This does not preclude definition of functional interface at the γ-O and γ-R reference points (e.g., G.999.1).	2012-06-4A-038, 2012-06-4A-051
6.5.6	Agreed 20-June-12	that the reference model(s) shall be modified to address coordination of reverse power feed and POTS functions with G.fast transceiver behaviour.	2012-06-4A-051
6.5.7	Open 18-June-12	Should the reference model support zero touch OAM with separate Analogue front End and Digital Transceiver functional elements?	2012-06-4A-051
6.5.8	Open 18-June-12	Should the reference model support at least two coordinating multi-line modules?	2012-06-4A-051
6.5.9	Agreed 20-June-12	that the G.fast reference model(s) shall support both TR-167 and TR-156 GPON and X-GPON instances.	2012-06-4A-062
6.5.10	Closed 20-June-12	Should the G.fast reference model support both a layer 2 switch in the DP, and should it also support moving the layer 2 switching function to the OLT? • Implied by agreed Issue 6.5.9	2012-06-4A-062
6.5.11	Closed	Should the FTU-O support the G.int standard? • To be addressed in G.int.	2012-06-4A-062
6.5.12	Agreed 20-June 12	that the G.fast reference model(s) shall include instances utilizing point-to-point fibre backhaul.	discussion
6.6		**Initialization**	
6.6.1	Agreed 4-Nov-11	that G.994.1 shall be used for the first phase of full initialisation for G.fast.	11RV-040, 11RV-052
6.6.1.1	Agreed 14-Dec-11	that the G.fast G.994.1 phase shall support at least the A43 tone set.	11RV-040, C1859R1

New Item Number	Status	Item Description	Reference(s)
6.6.1.2	Open 3-Nov-11	Should G.fast initialization include a pause to permit firmware download to the remote node before line code specific initialization proceeds?	11RV-040
(6.6.1.4)			
6.7		**Timing transport (NTR, ToD)**	
6.7.1	Agreed 4-Nov-11	that the pair of xTU-O and xTU-R shall support (mandatory to implement, optional to enable) transport of an 8 kHz NTR from γ-O to γ-R.	11RV-045
6.7.2	Open 3-Nov-11	Should the pair of xTU-O and xTU-R support transport of Time-of-Day from γ-O to γ-R?	11RV-045
6.7.2.1	Open 3-Nov-11	Should the xTU-O support the γ-O ToD signals *ToD_mc_value*, *ToD_mc_edge*, and f_{mc} as defined in G.993.2?	11RV-045
6.7.2.2	Open 3-Nov-11	Should the xTU-R support the γ-R ToD signals *ToD_sc_value*, and *ToD_sc_edge* and optionally support the ToD signal f_{mc} as defined in G.993.2?	11RV-045
6.7.2.3	Open 3-Nov-11	Should the γ-O to γ-R ToD accuracy be in the order of 50 nsec?	11RV-045
6.8		**OLR**	
6.8.1 (formerly 6.1.9)	Open 3-Nov-11	Should G.fast investigate and define a mechanism that allows regaining the capacity that would be lost when configuring a noise margin?	11RV-046, C1930
6.8.1.1 (formerly 6.1.9.1)	Open 3-Nov-11	Should G.fast define an enhancement modulation layer, coupled with an ARQ scheme, for the purpose of regaining the capacity that would be lost when configuring a noise margin?	11RV-046, C1930
6.8.1.2 (formerly 6.1.9.2)	Open 7-Dec-11	Should G.fast use a multi-layer TCAM modulation, for the purpose of regaining the capacity that would be lost when configuring a noise margin?	C1938, 2012-02-4A-041
6.8.1.3 (formerly 6.1.9.3)	Open 7-Dec-11	Should G.fast use a multi-layer TCAM modulation as a low power mode, enabling power savings adaptive to user traffic?	C1938, 2012-02-4A-041
6.8.1.4 (formerly 6.1.9.4)	Open 22-Feb-12	Should G.fast use a multi-layer TCAM modulation with noise scaling for increased robustness?	2012-02-4A-041, (2012-05-4A-048), (2012-05-4A-050), 2012-06-4A-034
6.8.1.4.1	Open 7-May-12	Should G.fast use hierarchical modulation to enhance the retransmission scheme, in which retransmissions are placed in the top layers of the modulation hierarchy?	2012-05-4A-049
6.8.1.4.2	Open 7-May-12	Should the number of active layers be constant for the duration of the TDD frame, but can be changed by the transmitter on a TDD frame basis?	2012-05-4A-049
6.8.1.4.3	Open 7-May-12	Should the transmitter be able to de-activate the lowest active layer if the time-to-live of a DTU is approaching zero?	2012-05-4A-049
6.8.1.4.4	Open 7-May-12	Should the transmitter be able to de-activate the lowest active layer if the error-free throughput is lower than the transmission capacity in the remaining active layers?	2012-05-4A-049
6.8.1.4.5	Open 7-May-12	Should the transmitter be able to re-activate the highest inactive layer if no or very few retransmission request have been received for previous TDD frame?	2012-05-4A-049
6.8.1.4.6	Open 7-May-12	Should the receiver control functions be facilitated through communication of the deltaQ value or through receiver detection of the deltaQ value?	2012-05-4A-049
6.8.2	Open 7-May-12	Should traffic adaptive on-line reconfiguration mechanism(s) be specified for G.fast?	2012-05-4A-029, 2012-05-4A-031

New Item Number	Status	Item Description	Reference(s)
6.8.2.1	Open 7-May-12	Should G.fast define traffic-adaptive online reconfiguration method to enhance SNR margin that requires exchange of bit-allocation and gain-allocation tables as described in 2012-05-4A-031?	2012-05-4A-031
6.8.2.2	Open 7-May-12	Should G.fast define a fast method of traffic-adaptive online reconfiguration to enhance SNR margin as described in §4 of 2012-05-4A-031 that does not require exchange of bit-allocation and gain allocation tables?	2012-05-4A-031
6.8.3	Open 7-May-12	Should the transmitter-initiated on-line reconfiguration method described in 2012-05-4A-032 be adopted for G.fast?	2012-05-4A-032
6.8.4	Open 7-May-12	Should G.fast define a fast rate parameter adjustment protocol to accommodate rapidly changing noises and channel characteristics?	2012-05-4A-043, 2012-06-4A-027, 2012-06-4A-071
6.8.4.1	Open 7-May-12	Should G.fast adopt the fast rate adaptation framework as described in 2012-06-4A-071?	2012-05-4A-043, 2012-06-4A-071
6.8.4.2	Open 18-June-12	Should the number of retransmissions be used as an alternative to SNR measurements as a trigger for OLR?	2012-06-4A-034
6.8.5	Agreed 21-June-12	that G.fast shall define seamless on-line reconfiguration (OLR) procedure(s) supporting: • dynamic modification of frame format (e.g., size of the frame, number of US and DS time slots; • dynamic modification of transmission parameters (e.g., frequency notching, FEC settings) • power management.	2012-05-4A-055, 2012-06-4A-027
6.8.6	Open 7-May-12	Should the OLR procedure allow an efficient trade-off between the reliability of the parameter adaptation and the parameter adaptation time, controlled by the management system?	2012-05-4A-055, 2012-06-4A-027
6.8.7	Open 7-May-12	Should G.fast define a reliable management channel to support OLR procedure?	2012-05-4A-055, 2012-06-4A-027
7.		**RFI**	(C-1402)

Appendix I

In consideration of the items discussed in section **Error! Reference source not found.** and an additional expectation that the operating bandwidth of G.fast will be greater than 100 MHz **Error! Reference source not found.**, we give priority toward minimizing the ADC, DAC, and LD dynamic range complexity, which would help enable lower transceiver power dissipation. We therefore propose selection of TDD as the duplex method for G.fast. The issue of centralized timing required for TDD operation in the access network has been resolved with the support network time synchronization protocols (e.g. Time-of-Day transport) in the fiber optic (PON) feed to the DP. This network time synchronization mechanism also helps to facilitate the use of vectoring in G.fast. In support of provisioning an operator defined asymmetry ratio of the downstream and upstream bit rates, TDD permits good flexibility **Error! Reference source not found.**.

Recognizing that the roundtrip time in TDD operation may have impact on command/response based operations like OLR and retransmission **Error! Reference source not found.**, the definition of the super-frame size, US/DS cycle time, etc. of a TDD system will need to be carefully defined in support of the transmission objectives.

The items of fallback to legacy DSLs and SELT will need to be addressed as optional items via implementation specific approaches. To facilitate fallback to legacy VDSL and ADSL systems, we propose to define the use of Handshake in G.fast.