Cl **00** *SC* **0** *P* *L* # 4

Pete, Anslow Ciena

Comment Type **T** *Comment Status* **D**

[Comment submitted by the Editor on behalf of Jonathan Jew, J&M Consultants Inc]

It seems that the report doesn't consider the impact of conversion of data center switch architectures from the classical scheme to fabric architectures, particularly if non-blocking architectures are implemented.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The Bandwidth Assessment Ad Hoc Report summarises (and draws conclusions from) the information that was presented to the BWA Ad Hoc during 2011. While including new information during the report review process could improve the coverage of the report, this would be an open-ended process that would be likely to extend beyond the 18 month life of the Ad Hoc.

This is pointed out in 1.2 Assessment limitations.

Cl **00** *SC* **0** *P* *L* # 1

Ran, Adee Intel

Comment Type **E** *Comment Status* **D**

Use of bits and bytes as data units, and various prefixes is inconsistent throughout the document. Examples:
1. In page 17 one can find terabits, Tb, Tbps, Tb/s in close proximity
2. Exabytes sometimes shortened to EB (not a common acronym yet)
3. Data rates and bandwidths appear both as GB/s and Gb/s which can be confusing
4. In page 19 one can find "petabyte", "pettabyte", "Mbytes/s", and "Gb/s" in the same paragraph.

SuggestedRemedy

1. Standardize to [prefix]b/s (e.g. Tb/s instead of Tpbs)
2. Use [full prefix][byte|bit] (e.g. exabyte instead of EB) in main text, shorten to SI notation [short prefix][B|b] (e.g. GB) in captions, avoid [short prefix]Byte and [short prefix]Bit
3. Correct pettabyte to petabyte

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change "Tbps" to "Tb/s" (2 instances) Page 14, lines 2 and 3.
Change "bps" to "b/s" in Figure 18 (5 instances), Figure 19 (18 instances), Figure 20 (5 instances), Figure 21 (6 instances), Figure 22 (3 instances), Figure 23, Figures 25 through 30, Figure 34, Figure 35, Figure 39 (2 instances).
Since the draft uses both bits and bytes, to ensure clarity use the full version for terms with bytes rather than abbreviation.
Change "EB" to "exabyte" (5 instances) Page 5, lines 37 and 37, Page 6, line 4, Page 8, lines 27 and 27.
Change "ZB" to "zettabyte" (3 instances) Page 9, lines 12, 12 and 13.
Change "Gbyte" to "gigabyte" (4 instances) Page 5, lines, 25, 25, 26 and 26.
Change "Mbyte" to "megabyte" Page 16, line 11.
Change "pettabyte" to "petabyte" (5 instances) Page 7, lines 29, 30, 31 and 31, Page 16, line 10.

Cl **01** *SC* **1** *P* **2** *L* **25** # 5

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

In caption to Figure 1, suggest to change "2007 IEEE 802.3 HSSG bandwidth findings" to "2007 IEEE 802.3 HSSG bandwidth demand projections", given that it is what the figure shows - curves shooting off into the future are based on projections rather than findings ...

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
In caption to Figure 1, change:
"2007 IEEE 802.3 HSSG bandwidth findings" to:
"2007 IEEE 802.3 HSSG bandwidth demand projections"

[Editor's note: Page changed from 5 to 2]

Cl **01** *SC* **1** *P* **2** *L* **27** # 6

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

Statement read funny and narrative without any need: "Looking ahead, the exponential growth cited by multiple end-users was such that they told the HSSG that work on the next speed of Ethernet needed to begin once 100 Gigabit Ethernet was completed"

SuggestedRemedy

Change to "Looking ahead, the exponential growth cited by multiple end-users indicated the clear need to start the work on the next speed of Ethernet once 100 Gigabit Ethernet was completed"

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The existing text makes it clear that it was the opinion of some users that work needed to begin once 100G was done. The proposed replacement implies that the need to begin once 100G was done was clear, which is a completely different statement.

[Editor's note: Page changed from 5 to 2]

Cl **01** *SC* **1** *P* **2** *L* **29** # 36

D'Ambrosia, John Dell

Comment Type **E** *Comment Status* **D**

Statement is incomplete in light of data presented in Figure 1
Looking ahead, the exponential growth cited by multiple end-users was such that they told the HSSG that work on the next speed of Ethernet needed to begin once 100 Gigabit Ethernet was completed [2], [3], [4].

SuggestedRemedy

Add after sentence
This need is corroborated by the bandwidth growth rate for core networking illustrated in Figure 1, where 400Gb/s is needed by 201x and 1 Tb/s is needed by 2015.

Please note it is not clear from figure what year 400Gb/s is needed, and has been left as 201x.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: This comment was received after the deadline and its inclusion is subject to Ad Hoc approval]

Add after sentence:
"This need is corroborated by the bandwidth growth rate for core networking illustrated in Figure 1, where 400 Gb/s is shown as needed by 2013 and 1 Tb/s is shown as needed by 2015."

Cl **01** *SC* **1.1** *P* **2** *L* **45** # 7

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

Comma missing: "To gather this information the ad hoc sought out contributions" should be "To gather this information, the ad hoc sought out contributions"

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"To gather this information the ad hoc …" to:
"To gather this information, the ad hoc …"

[Editor's note: Page changed from 5 to 2]

Cl **02** *SC* **2.2** *P* **3** *L* **52** # 8

Hajduczenia, Marek ZTE Corporation

Comment Type **ER** *Comment Status* **D**

"... and increased services. " - it is unclear what "increased sevice" really means. Does it imply higher data rate? Better QoS ?

SuggestedRemedy

Please clarify what this means and add specific quantifiers, if possible.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change
"… increased access methodologies and rates, and increased services." to:
"… increased access methodologies and rates, and increased services (such as, but not limited to, video on demand, social media, etc.)."

[Editor's note: Page changed from 6 to 3]

Cl **02** *SC* **2.2** *P* **3** *L* **52** # 9

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

"It was simplistically cap tured by Equation (1)." - equation (1) is not marked anywhere. Reader has to assume it is the equation on page 7 at the top.
Also, please proper style for equations that is typically used in 802.3 drafts.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Add "(1)" to the right of the equation.

This is not an equation in the normally accepted sense as it has "bandwidth explosion" as the right hand side. Also, it is quoted from another document so the format shouldn't change too much.

[Editor's note: Page changed from 6 to 3]

Cl **02** *SC* **2.2** *P* **4** *L* **38** # 10

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

It is unclear what the adjective "fixed" in table 2 caption is intended to mean. Remove ?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The word "fixed" indicates that this is traffic generation from these devices on a fixed network rather than on a mobile network.

Change:
"compares the amount of traffic that" to:
"compares the amount of traffic on a fixed network that"

Also change the title of Table 2 to:
"Fixed network traffic generation comparison"

[Editor's note: Page changed from 7 to 4]

Cl **02** *SC* **2.2** *P* **5** *L* **25** # 11

Hajduczenia, Marek ZTE Corporation

Comment Type **ER** *Comment Status* **D**

Inconsistent format of units of information. You use "Gbytes" but "exabytes". Either expand all and use "gigabytes", "megabytes" etc. or use proper acronyms i.e. "GB", "EB" etc. which are commonly known and use in text.
Given the use of "EB" in text in line 37 and further (same page), i'd suggest the second approach i.e. using proper acronyms.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See Response to comment #1

[Editor's note: Page changed from 8 to 5]

Cl **02** *SC* **2.3** *P* **6** *L* **45** # 12

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

"The total amount of data created or replicated on the planet in 2010 was over 1 zettabyte (1 zettabyte is 10^21 bytes) "
First, "on the planet" seems wired. We do not have any other planets last that I checked. Suggest to strike it
Second, following one previous comment of mine, zetabyte should be marked as ZB

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Only having one planet doesn't mean that "The total amount of data created or replicated on the planet in 2010 …" is incorrect. This makes it clear that all data worldwide is included.

The use of zettabyte rather than ZB makes it clearer that this is bytes rather than bits. See response to comment #1

[Editor's note: Page changed from 9 to 6]

Cl **02** *SC* **2.3** *P* **7** *L* **29** # 13

Hajduczenia, Marek ZTE Corporation

Comment Type **ER** *Comment Status* **D**

" ... which generates 15 pettabytes of data per year (1 pettabyte is 10^15 bytes) …" - please use PB for petabyte consistently. Also, last that I checked it is spelled "petabyte" and not "pettabyte" - see the list of SI prefixes for reference

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See Response to comment #1

[Editor's note: Page changed from 10 to 7]

Cl **02** *SC* **2.3** *P* **8** *L* **13** # 34

Chalupsky, David Intel Corp.

Comment Type **E** *Comment Status* **D**

typo in figure

SuggestedRemedy

change "Adapte" to "Adapter"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: Page changed from 11 to 8, subclause changed from "fibgure 4" to 2.3]

Cl **02** *SC* **2.4.1** *P* **10** *L* **50** # 2

Ran, Adee Intel

Comment Type **E** *Comment Status* **D**

The text here and information in page 11 refer to "total bandwidth" which is apparently measured for a bidirectional link. In other parts of the document, bandwidth is a property of a unidirectional link (bidirectonal data is only used for traffic). This is especially confusing in this subclause since it is followed by a discussion of Ethernet which uses unidirectional bandwidth.

SuggestedRemedy

1. Change "total bandwidth" to "bidirectional bandwidth" in page 10 line 50, and figure 9 y-axis label.
2. Change "PCIe bandwidth" to "PCIe bidirectional bandwidth" in page 10 line 51.
3. Change table 5 caption to "PCIe bidirecitonal bandwidth" and remove "total bandwidth" from column 1.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
"Bidirectional bandwidth" does not seem to be any clearer than total bandwidth.
Change "total bandwidths" to "total bandwidths (both directions)" Page 10, line 50.
Change Figure 9 Y axis label from "Total bandwidth in GBs" to "Total bandwidth (both directions) gigabyte/s"
Change "PCIe bandwidth" to "PCIe bandwidth (both directions)" Page 10, line 51.
Change Table 5 caption to "PCIe bandwidth (both directions)" and in column 1 change "Total Bandwidth (GB/s)" to "(gigabyte/s)"

Cl **02** *SC* **2.4.1** *P* **11** *L* **38** # 14

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

"It was suggested that PCIe 4.0 would enable dual 100GbE server ports starting in 2015." - reference to such a claim would be nice.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
This was the opinion of the author of the presentation to the Ad Hoc
Change:
"…starting in 2015." to
"…starting in 2015 [8]."

[Editor's note: Page changed from 14 to 11]

Cl **02** *SC* **2.4.1** *P* **11** *L* **49** # 15

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

"translating into 40 or 80 cores in the Romley cycle" - I assume this is reference to Intel architecture name. Please provide reference or clarify that, if such.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"... in the Romley cycle," to:
"... in Intel's Romley cycle,"

[Editor's note: Page changed from 14 to 11]

Cl **02** *SC* **2.4.1** *P* **12** *L* **1** # 16

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

Acronyms "LOM" and "NIC" are not defined but used in Table 6

SuggestedRemedy

Please define these acronyms or consider adding a list of acronyms at the front of the document. There are already so many of them ...

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Add a new Clause 1 Abbreviations
Expand the abbreviations on first use where appropriate.

[Editor's note: Page changed from 15 to 12]

Cl **02** *SC* **2.4.2** *P* **12** *L* **47** # 17

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

"At this point in time, the US government is targetin g an exascale machine by 2019, which is more than two orders of magnitude in performance improvement over today's fastest machines."
First, do we need to state it is US government? Others do not? I think we have seen many announcements of this type. Suggest to remove
Second, reference would be nice for a reader to such announcement.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The information that was provided to the Ad Hoc was that the US government is targeting this, so it is correct to make this statement.
Add reference [12] at the end of the sentence.

[Editor's note: Page changed from 15 to 12]

Cl **02** *SC* **2.4.4** *P* **15** *L* **21** # 35

Chalupsky, David Intel Corp.

Comment Type **E** *Comment Status* **D**

inconsistent spelling of center/centre

SuggestedRemedy

change "centre" to "center" to be consistent with the 20 other instances of the word.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: Page changed from 18 to 15, subclause changed from "Figure 11" to 2.4.4]

Cl **02** *SC* **2.4.4** *P* **15** *L* **6** # 30

Chalupsky, David Intel Corp.

Comment Type **TR** *Comment Status* **D**

Percent of links at higher speeds (40/100G) seems inconsistent with other reports and sections. More background data or clarification would be useful. What is included in the count of data center "links?" Are the server ports included? Also on mediain table 10: what technologies run at 40Gb/s and 100Gb/s over copper structured cable? Are these discrete links, or aggregated links running at lower speed? The data as presented is unclear and confuses the report.

SuggestedRemedy

Provide clarification on what ports/links are counted in the data center. Further define what technoloies / PHY types are running on media vs. speed.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This information is not available as this section reports on the results of a survey.

See also comment #31
[Editor's note: Page changed from 18 to 15]

Cl **02** *SC* **2.5** *P* **16** *L* **10** # 18

Hajduczenia, Marek ZTE Corporation

Comment Type **ER** *Comment Status* **D**

"The ATLAS detector generates [tilde]1 petabyte per second from the instrument (1 pettabyte is 10^15 bytes) "
First, petabyte was defined before.
Second, it is petabyte, not pettabyte
Third, it should be written as PB, not expanded.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
While it is true that petabyte was explained earlier, users of this report may not read all sub-sections, so it is desirable for each section to stand alone.
The use of petabyte rather than PB makes it clearer that this is bytes rather than bits.
See response to comment #1 for correction to spelling of petabyte.

[Editor's note: Page changed from 19 to 16]

Cl **02** *SC* **2.5** *P* **16** *L* **19** # 19

Hajduczenia, Marek ZTE Corporation

Comment Type **ER** *Comment Status* **D**

"Cost of sequencers is plummeting (10x over 5 years) – Human genome sequencing cost $10,500 in July 2011 from $8.9 million in July 2007 – NYTimes"

- are we allowed to speak of cost in dollars ?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The cited reference is to a topic far removed from the activities we are engaged in. It is a publicly available reference to a third party (NYTimes) and is historical in nature.
[Editor's note: Page changed from 19 to 16]

Cl **02** *SC* **2.6** *P* **20** *L* **1** # 20

Hajduczenia, Marek ZTE Corporation

Comment Type **ER** *Comment Status* **D**

"Figure 16 illustrates an exemplar external network. The next generation network will employ a flat layer 2 approach with reaches of approximately 1000 feet needed." - text is confusing in the context of Figure 16. Where are these 1000 feet connections shown? It is not entirely clear what this figure is supposed to represent and how this is related with the need for bandwidth.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Move the text "The next generation network will employ a flat layer 2 approach with reaches of approximately 1000 feet needed." to be after Figure 16.
Combine this paragraph with the next two (beginning with "Within an" and "There are") to form a single paragraph which ends with the reference [21] (where the 1000 feet value is recorded).

[Editor's note: Page changed from 22 to 20]

Cl **02** *SC* **2.6** *P* **21** *L* # 3

Ran, Adee Intel

Comment Type **E** *Comment Status* **D**

Figure 14 - multiple "area plots" - message is not clear: is it a cumulative plot? does it mean that options data comprise >90% of traffic (and is the only growth factor)? or do all graphs have similar values and growth rates?

SuggestedRemedy

If it is a group of line plots - remove the area below each plot.
If it is a cumulateive plot - state it in the text; also I would suggest re-ordering the data so the lower values appear at the bottom (as in figure 15) - that would be less confusing.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change
"how the number of messages per second" to:
"how the total number of messages per second"

Cl **02** *SC* **2.7** *P* **20** *L* **1** # 25

Cloonan, Tom ARRIS

Comment Type **TR** *Comment Status* **D**

I would like to propose replacing the entire Section 2.7 on "Cable Data" with the slightly modified text that is outlined below in the SuggestedRemedy.

This change is partly editorial, in that there were some errored lines and it also was pointed out to me that the coverage of Upstream and Downstream traffic was not symmetrical… we gave more details on Downstream than Upstream. The change is partly technical, in that it was pointed out to me that the bandwidth consumption information is more appropriate to describe in terms of aggregate byte consumption for a head-end than the per-subscriber numbers that I was using… mainly because the per-subscriber numbers can be misleading, as the actual numbers for each subscriber can vary quite a bit. As a result, the commenter to me indicated that the use of an aggregate byte consumption metric is less misleading.

The new proposed text is inserted in the Suggested Remedy Section below.

In addition, the new Figures are contained in cloonan_01_0312, with the associated Figure number at the top of the page.

Thanks,
Tom

SuggestedRemedy

Here is the proposed text to use in place of the current section 2.7:

This section discusses the bandwidth trends for the cable industry and also aims to predict that trend in the future. The various devices involved in the cable infrastructure [9] are shown in Figure 17.

Figure 17-The cable infrastructure
[as per Figure 17 in D1.0]

The bandwidth related terms that are used in this section are defined according to Figure 18.

Figure 18-Bandwidth related terms
[replacement figure as in cloonan_01_0312]

The average consumed bandwidth is used quite extensively for traffic engineering calculations (determining how much capacity is required to satisfy a given Service Group (pool) of subscribers).

Data for the maximum permitted downstream bandwidth over time is plotted in Figure 19 [9]. This plot (which is on a logarithmic vertical scale) shows a roughly constant rate of increase in maximum permitted downstream bandwidth of about 1.5 times per year over the 29 years from 1982 to 2011.

Figure 19-Maximum permitted downstream bandwidth trend
[as per Figure 19 in D1.0]
This trend (a 50% Compound Annual Growth Rate (CAGR) for a high end user's Internet connection speed) is called "Nielsen's Law of Internet bandwidth". If this trend were to be continued, it would predict a maximum permitted downstream bandwidth of about 300 Mb/s by 2016.

Data for the average downstream byte consumption for a typical 40K HHP (House-Holds Passed) head-end over time is plotted in Figure 20. This plot (which is also on a logarithmic vertical scale) predicts an average downstream byte consumption in a 40K HHP head-end of about 8.5x10**15 bytes by 2016 which is an increase of roughly 10 times over the average downstream byte consumption seen in 2011.

Figure 20-Average downstream byte consumption trend
[replacement figure as in cloonan_01_0312]

Data for the maximum permitted upstream bandwidth over time is plotted in Figure 21 [9]. This plot (which is on a logarithmic vertical scale) shows a roughly constant rate of increase in maximum permitted upstream bandwidth of about 1.1 times per year. Upstream bandwidth is comprised of two types of traffic: protocol messages (e.g., HTTP GETs, TCP ACKs, etc.) and uploads (e.g., P2P torrents, web page inputs, FTP transfers). The protocol message bandwidth is predictable [9] and so it should increase in line with the rate of downstream bandwidth increase. The upload bandwidth is harder to predict [9] as it is highly dependent on the popularity of apps at any given time. For example when P2P represented a large percentage of the traffic in 2008, upstream bandwidth was [tilde]41% of downstream bandwidth. However, when over the top IP video became popular in 2010, upstream bandwidth dropped to be only [tilde]28% of downstream bandwidth.

Figure 21-Maximum permitted upstream bandwidth trend
[as per Figure 21 in D1.0]

If the maximum permitted upstream bandwidth trend continues to grow at a 10% CAGR, then it would be expected rise to [tilde]8 Mb/s by 2016. However, indicators are that this upstream trend could grow at a much faster rate in the next four years.

Data for the average upstream byte consumption for a typical 40K HHP (House-Holds Passed) head-end over time is plotted in Figure 22. This plot (which is also on a logarithmic vertical scale) predicts an average downstream byte consumption in a 40K HHP head-end of about 4.2x10**14 bytes by 2016 which is an increase of roughly 2.7 times over the average downstream byte consumption seen in 2011.

Figure 22-Average upstream byte consumption trend
[new figure as in cloonan_01_0312]

In the period since 2009, there has been a rapid uptake of over-the-top IP video which has helped drive the continual increase in downstream consumption that is shown in Figure 20. This transition has also changed the mix of traffic types carried over the cable networks. These changes can be clearly viewed within Figure 23.

Figure 23-Mix of traffic type vs. time
[new figure as in cloonan_01_0312]

In order for the bandwidth trends predicted above to materialize, the available equipment must be able to support the predicted bandwidths at acceptable cost levels. The following explores this topic from the point of view of DOCSIS Cable Modem Termination System (CMTS) equipment, which serve 20 to 50 "Service Groups". For a typical single high speed data "Service Group" with [tilde]1000 homes passed, MSOs [9] predict:
o 2008: 1 DOCSIS Downstream ([tilde]40 Mb/s)
o 2011: 4 DOCSIS Downstreams ([tilde]160 Mb/s)
o 2015: [tilde]20 DOCSIS Downstreams ([tilde]800 Mb/s)

To support this need the Converged Cable Access Platform (CCAP) has been designed with a 20 to 80 times increase in capacity, a 14 to 60 times power per bit reduction and a 20 to 80 times space per bit reduction [9]. The new technologies becoming available to support this are described in Table 11.

Table 11-Enabling technologies for CCAP

Building blocks	2007 capabilities	2011 capabilities	Increase factor
L2/L3 switches	60 Gbps	640 Gbps	10
Digital-to-analog converters	1 channel/chip	100+ channels/chip	100
Burst receivers	2 channels/chip	12 channels/chip	6
Processor chips	2 cores/chip	32 cores/chip	16

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Make the proposed changes.
Also, delete "Even within the USA Figure 23 shows a variation between different service providers in growth of average downstream bandwidth per subscriber in 2010 between 33 % and 100 %." from 3.3 as the figure referred to is no longer present.
Also, remove reference [22] as it is no longer referred to in the text.

[Editor's note: tilde character replaced by [tilde] in Suggested Remedy as tilde is used as the record delimiter in the database]

Cl **02** *SC* **2.7** *P* **21** *L* **1** # 21

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

"This trend (a 50% Compound Annual Growth Rate (CAGR) for a high " - CAGR was used before without definition. Suggest to put all acronyms in a single section upfront (for global reference) and then expand them on the first use.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See Response to comment #16
[Editor's note: Page changed from 24 to 21]

Cl **02** *SC* **2.7** *P* **23** *L* **4** # 26

Chalupsky, David Intel Corp.

Comment Type **T** *Comment Status* **D**

what is "over the top" IP video?

SuggestedRemedy

define "over the top IP video"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"over the top IP video" to:
"over the top IP video (delivery of video content from sources other than the ISP)"

[Editor's note: Page changed from 26 to 23]

Cl **02** *SC* **2.7** *P* **23** *L* **4** # 27

Chalupsky, David Intel Corp.

Comment Type **E** *Comment Status* **D**

the term "over the top" is used three times on this page, but inconsistent use of hyphens; two with, one without hyphens. Be consistent.

SuggestedRemedy

either change all "over the top" to "over-the-top" or change all "over-the-top" to "over the top"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change to "over-the-top"

[Editor's note: Page changed from 26 to 23]

Cl **02** *SC* **2.8** *P* **26** *L* **22** # 28

Chalupsky, David Intel Corp.

Comment Type **E** *Comment Status* **D**

grammar issue

SuggestedRemedy

change "As the development level of Asian countries are so different" either to "As the development levels of Asian countries are so different" or to
"As the development level of Asian countries is so different"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change to "As the development levels of Asian countries are so different"

[Editor's note: Page changed from 29 to 26]

Cl **03** *SC* **3.1** *P* **34** *L* **39** # 22

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

"As discussed in 2.2, the number of internet users is steadily increasing" - should'nt Internet be capitalized ?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change "internet" to "Internet".

[Editor's note: Page changed from 37 to 34]

Cl **03** *SC* **3.1** *P* **34** *L* **41** # 23

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **D**

"These factors are predic ted to combine to cause ..." reads wierd. Suggest to reword to "These factors combined are predicted to cause ..."

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change:
"These factors are predicted to combine to cause ..." to:
"These factors combined are predicted to cause ..."

[Editor's note: Page changed from 37 to 34]

Cl **03** *SC* **3.2** *P* **35** *L* **17** # 31

Chalupsky, David Intel Corp.

Comment Type **T** *Comment Status* **D**

related to my comment on section 2.4.4: the claim that 22% of data center links will be 100G in 2013 seems unlikely. How is this counted? Does it include link aggregation? Does it include server access links? Would be useful to seek clarification from the contributor. Maybe the answer is that the survey was unclear in this regard and that's simply how people responded…

SuggestedRemedy

see comment; provide clarification to questions asked.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This information is not available as this section reports on the results of a survey.

See also comment #30
[Editor's note: Page changed from 38 to 35]

Cl **03** *SC* **3.3** *P* **35** *L* **49** # 29

Chalupsky, David Intel Corp.

Comment Type **E** *Comment Status* **D**

frivolous capitalization

SuggestedRemedy

change "Data Centers" to "data centers"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: Page changed from 38 to 35, subclause changed from 3.8 to 3.3]

Cl **03** *SC* **3.4** *P* **36** *L* **53** # 24

Hajduczenia, Marek ZTE Corporation

Comment Type **ER** *Comment Status* **D**

According to Style Manual, reference to colour should not be made, given that these are not readable in B&W printouts. Use a separate style (dash-dot) rather than colour to separate and single this curve out. Same for other curves, which whgen printed in B&W are not distinguishable.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The IEEE style manual states: "Color in figures shall not be required for proper interpretation of the information."

Although the color of the line is mentioned here, the lines are explicitly labelled, so the color is not required for proper interpretation of this figure.

Label the lines in Figure 32. If not overtaken by Comment #25 also label the lines in Figure 22.

[Editor's note: Page changed from 39 to 36]

Cl **03** *SC* **3.4** *P* **39** *L* # 32

Chalupsky, David Intel Corp.

Comment Type **T** *Comment Status* **D**

Great summary! Particularly like the graph in figure 40, and mapping it to the 2007 HSSG growth rate projections.

SuggestedRemedy

None. This is a comment, but not a request for change to the draft. :)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Make no change to the draft.

Cl **99** *SC* *P* *L* # 33

Chalupsky, David Intel Corp.

Comment Type **E** *Comment Status* **D**

Front matter page numbers are roman, then page numbers restart with arabic after table of contents. This seems inconsistent with other 802.3 drafts. Also it will confuse the comment submission. FYI my comments use the pdf file page number, not the page number printed on each sheet.

SuggestedRemedy

Start page numbering with "1" at begining of file.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This is consistent with 802.3 published documents, and will allow the report as reviewed to be published with minimum change.