### IEEE P802.11 - TASK GROUP N - MEETING UPDATE:

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# Status of Project IEEE 802.11n

### Standard for Enhancements for Higher Throughput

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## March 2009, Vancouver, British Columbia, Canada

The TGn Draft 8.0 proceeded to sponsor ballot recirculation, where the ballot passed by a 80.1% majority (75% required). 277 members are in the sponsor ballot pool. 228 votes were received with 169 votes to approve, 42 not approve.

The comment resolution committee resolved the 77 comments received, and authorized the editor to create a Draft 9.0 for further balloting.

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## January 2009, Los Angeles, Calfornia, US

TGn Draft 7.0 was recirculated in an unchanged form, and passed this recirculation ballot #138 by a 95.25% majority (75% required) with 281 votes to approve, 14 not approve.

This met the conditions to forward the 802.11n draft to sponsor ballot. The draft then passed this sponsor ballot #1 by a 77.8% majority (75% required). 277 members are in the sponsor ballot pool. 224 votes were received with 158 votes to approve, 45 not approve.

The comment resolution committee reviewed the 241 comments received, and will continue to do so beyond the end of this meeting.

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## November 2008, Dallas, Texas, US

TGn Draft 7.0 passed recirculation ballot #136 by a 94% majority (75% required) with 276 votes to approve, 17 not approve, 21 abstain.

The 48 comments from this recirculation ballot were resolved or withdrawn with no approved changes, and the working group approved a recirculation ballot on the unmodifed text of Draft 7.0.

The group authorized a report to the 802 executive committee (EC) on the requirements for conditional approval to forward 802.11n to sponsor ballot.

**AX Wireless, LLC**
**Exhibit AXW-2030**
**Intel v. AX Wireless**
**IPR2023-01145**
AXW-2030-001

## September 2008, Waikoloa, Hawai'i, US

TGn Draft 6.0 passed recirculation ballot #134 by a 91% majority (75% required) with 266 votes to approve, 27 not approve, 21 abstain.

All 195 comments from this recirculation ballot were resolved or withdrawn during this meeting, and the working group approved a recirculation ballot on a TGn Draft 7.0, incorporating these comment resolutions.

The group authorized the extension of teleconference calls to four hours each and may have an ad hoc meeting on November 7-8 for an ad hoc meeting to resolve comments from the recirculation ballot on Draft 7.0.

## July 2008, Denver, Colorado, US

TGn Draft 5.0 passed recirculation ballot #129 by a 90% majority (75% required) with 261 votes to approve, 29 not approve, 23 abstain.

All 1112 comments from this recirculation ballot were resolved during this meeting, and the working group approved a recirculation ballot on a TGn Draft 6.0, incorporating these comment resolutions.

The timeline was modified, and now anticipates publication in November 2009 instead of July 2009. The group is targeting September 3-5 for an ad hoc meeting to resolve comments from the recirculation ballot on Draft 6.0.

## May 2008, Jacksonville, Florida, US

TGn Draft 4.0 passed recirculation ballot #124 by an 88% majority (75% required) with 253 votes to approve, 34 not approve, 25 abstain.

All 349 comments from this recirculation ballot were resolved during this meeting, and the working group approved a recirculation ballot on a TGn Draft 5.0, incorporating these comment resolutions.

The current TGn leadership was reaffirmed except for the secretary, who had resigned as a result of a change of employment.

## March 2008, Orlando, Florida, US

TGn completed the resolution of all 190 remaining comments from the recirculation ballot on TGn Draft 3.0.

This led to the approval of a new recirculation ballot on TGn Draft 4.0, which now stands at 547 pages, and an update of the approval timeline. This recirculation ballot is expected to be completed by the time of the next meeting, which will be focused on the resolution of any new comments.

The TGn leadership elections will also be held at the May meeting.

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## January 2008, Taipei, Taiwan

TGn continued with resolution of comments received during working group recirculation ballot #115 on TGn Draft 3.0.

All previously approved editorial comments and 99 previously approved technical comment resolutions were incorporated into draft 3.02 and that version was approved. Entering the January session there were 503 technical comments remaining to be resolved. Based upon resolution preparation performed following the November meeting, in an prior ad hoc and during this session there were 376 resolutions approved. There remain 127 unresolved comments. Preparation of resolution will continue on teleconferences an in ad hoc meeting to occur in March.

It is expected that all remaining comments will be resolved and that TGn and WG11 will subsequently release Draft 4.0 for working group recirculation ballot following the March meeting.

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## November 2007, Atlanta, Georgia, US

TGn Draft 3.0 was approved in working group recirculation ballot #115. Of the 325 eligible voters, 240 voted affirmative, 43 negative, and 27 abstained – resulting in a successful 84.8% affirmative vote.

This vote generated 884 unique comments (602 technical, 282 editorial). The editor was authorized to produce a draft 3.01 including resolution of editorial comments, and the work this week additionally resolved approximately one-sixth of the technical comments.

Comment resolution will promptly continue in a series of authorized conference calls and a three day ad hoc session to precede the next interim meeting in Taipei.

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## September 2007, Waikoloa, Hawai'i, US

TGn resolved all remaining comments from the Draft 2.0 WG letter ballot, and delivered instructions to the editor to create Draft 3.0

Pending completion of this draft, a 15-day WG letter ballot will be issued. TGn is now on track to forming its sponsor ballot pool in November. The timeline will be reviewed at that time. It currently calls for publication of the final standard in October 2008.

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## July 2007, San Francisco, California, US

TGn resolved approximately 740 comments from the WG letter ballot on Draft 2.0. This leaves approximately 460 comments that must be resolved prior to completing and issuing a 15-day recirculation ballot on Draft 3.0.

Based on the comments that have been resolved to date, the group approved a TGn Draft 2.05. This draft also includes updates to the numbering of clauses, tables, figures, etc. based on the publication of IEEE 802.11 (2007).

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## May 2007, Montreal, Canada

TGn Draft 2.02 was adopted based on the approved technical and editorial comment resolutions to date.

The task group continued the comment resolution process, adopting resolutions to approximately 450 additional comments.

The group expects that the comment resolutions will be completed and a TGn Draft 3.0 will be issued for a recirculation ballot by September.

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## March 2007, Orlando, Florida, US

TGn Draft 2.0 was approved in the working group letter ballot that was authorized at the London interim meeting.

Of the 325 eligible voters in this ballot group, 231 voted affirmative, 46 negative, and 28 abstained. This resulted in a 94.2% return ratio, exceeding the 50% minimum requirement, and a 83.4% affirmative vote, exceeding the 75% necessary to affirm a draft.

Work now proceeds to the resolution of the 3076 unique comments (1635 technical, 1441 editorial) that accompanied the vote on draft 2.0. It is expected that the comment resolutions will be completed by September at which time TGn Draft 3.0 will be prepared and released for a recirculation ballot.

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## January 2007, London, UK

TGn voted to approve resolutions to the last 400 of the comments from the WG letter ballot issued last March, and to incorporate these into a new draft 1.10.

Pending the approval from a 15-day procedural letter ballot, the WG agreed to move this same draft specification in a separate 30-day WG letter ballot as a draft 2.0. Results of this letter ballot on 2.0 are intended to be collected and reviewed during the next meeting in March 2007 at Orlando.

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## November 2006, Dallas, Texas, US

TGn voted to accept draft version 1.06, incorporating all accepted technical and editorial comment resolutions prior to this meeting. An additional 800 comment resolutions were approved during the November session which will be incorporated into the next revision of the draft.

As of this meeting, three of the 8 comment topic ad hoc groups chartered in May have now completed their work and 88% of the technical comments have been resolved with approximately 370 remaining.

It is expected that the remaining comments will be resolved and approved during the January 2007 meeting after which a working group ballot on Draft 2.0 would occur.

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## September 2006, Melbourne, Australia

TGn voted to accept draft version 1.04, incorporating all accepted technical and editorial comment resolutions prior to this meeting.

The 8 comment topic ad hoc groups chartered in May continued their work, ending the week with acceptance of approximately 1000 comment resolutions leaving approximately 1000 unresolved comments.

Additionally, the task group discussed special topics including a security review of the

draft, coexistence analysis of both 20 and 40 MHz modes versus other wireless standards, and waveform generation.

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## July 2006, San Diego, California, US

TGn voted to adopt a new draft version 1.02 that incorporates all of the 6700 editorial comments from the prior WG letter ballot.

The ad hoc groups chartered in May to address the 8 comment topic areas continued their work, proposing resolutions to 49% of all of the voter suggestions by the end of the week. A portion of these were formally adopted by TGn, with the comment resolution and task group adoption process to continue in future meetings.

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## May 2006, Jacksonville, Florida, US

The WG Letter ballot issued after the March meeting failed to achieve the necessary 75% approval level. As is standard practice, the voters submitted suggestions as to how the draft could be improved. TGn began reviewing the comments received during the balloting process and proposed response text for comment resolution. To expedite the process the comments were grouped into 8 topic areas: PHY, MAC, PSMP, Coexistence, Editorial, Coexistence Assurance, Frame Format & General. For each of these topic areas an appropriate portion of the comments were allocated and an ad hoc chair was solicited from the task group to lead the discussion. Using this method it was possible to conduct several discussions in parallel.

Comment resolution activities are expected to continue via teleconferences, ad hoc meetings and regular sessions through the July and September meetings.

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## March 2006, Denver, Colorado, US

TGn is moving into letter ballot phase.

The specifications approved in January were converted into draft text for review by the membership. Additionally three critical, but previously absent, MIB, PICS and Coexistence Assurance document components were prepared and accepted. The draft preparation process also resulted in the identification of 150 omissions that needed to be filled. Submissions on these were prepared and approved by Task group n. All of these became “instructions to the editor to incorporate them into the draft”.

At the end of the week draft version 0.04 was prepared and deemed worthy of proceeding to letter ballot by TGn. The WG subsequently agreed and approved to move the draft specification to Working Group letter ballot. Results of the 40 day letter ballot will be collected and reviewed during the next meeting in May.

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## January 2006, Kona, Hawaii, US,

Task group n has voted unanimously to confirm selection of a joint proposal for high throughput wireless local area networks. This proposal will amend and extend the IEEE 802.11(TM) WirelessLAN standard to incorporate new technologies for increasing the throughput of wireless local area networks up to 600 Mbps.
Prior to and during the March session, the proposal will be formatted into draft format and further developed in preparation for issuance of a letter ballot. Additionally a coexistence assurance document, in compliance with requirements from 802.19, will be prepared for distribution with the letter ballot when it is issued.

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## September 2005, Garden Grove, California, US

The Joint Proposal group (now comprised of members from three proposal groups reinstated during the May meeting (TGn Sync, WWiSE and MITMOT) presented two status reports (05-0876 & 05-1001) regarding progress toward developing a merged proposal. The progress so far indicates that the goal of a complete proposal being presented and discussed during the November session is aggressive but reasonable. In anticipation of this, the November agenda incorporates extensive time for presentations and discussions followed by a confirmation vote and technical editor election.

Also discussed was the overall timeline for 11n. Based upon current status information the timeline as displayed at http://grouper.ieee.org/groups/802/11/, was deemed to be accurate. It will be reviewed again during November.

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## July 2005, San Francisco, California, US

The three proposal groups reinstated during the May meeting (TGn Sync, WWiSE and MITMOT) indicated that they have begun working together to create a single merged proposal. Consequently the task group voted to postpone the pending down select voting process until the merged document is ready. It is expected that a partial merged proposal will be posted for review during the September ‘05 meeting and a complete proposal will be ready for group review at the November ’05 meeting.

Additionally, FR10 and FR11 functional requirements describing a “single stream” mode of operation were approved for addition to the Functional Requirements document which has been updated to 03-0813 r13.

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## May 2005, Cairns, Queensland, Australia

TGnSync, as the single remaining technical proposal candidate, was engaged in 12 hours of presentation and discussion in the task group. This included discussion of voters comments about their reasons for voting against confirmation in the first confirmation vote held in March. After discussion, a second confirmation vote was held but the proposal failed to obtain the 75% membership approval required. As a consequence dictated by the TGn selection process, the previous three remaining proposals (TGn Sync, WWiSE and MITMOT) are reinstated for consideration by the task group. The task group will consider updated technical proposals and any mergers during its next session in July. Should there be more than one proposal entering the meeting in July, the remaining proposals will re-enter a round of elimination voting removing from consideration the proposal with the least support.

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## March 2005, Atlanta, Georgia

Two complete proposals known by the titles TGnSync and WWiSE each authored by large groups of individuals were presented to the Task Group for consideration this week. After many hours of discussions, a down select vote was conducted that resulted in TGn Sync obtaining a majority of the votes cast. TGnSync, as the single remaining candidate was then considered for confirmation as a basis for the first draft but failed to obtain the 75% membership approval required. Voters comments about their reasons for voting against confirmation will be reviewed by TGnSync between March and the next task group meeting in May were TGnSync will present responses, proposed cures and again request confirmation.

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## January 2005, Monterey, California

Three complete proposals known by the titles MITMOT, TGnSync and WWiSE were presented to the Task Group for consideration during the session.

After 14 hours of presentations and discussion a down select vote was held that resulted in the elimination of the MITMOT proposal. Further consideration of the remaining two proposals and further selection voting is planned for the next meeting in March.

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## November 2004, San Antonio, Texas, USA

62 letters of intent were submitted in response to the TGn call for proposals that closed on Friday June 18. 32 proposals were submitted to the IEEE 802wirelessworld server by Friday August 13 and subsequently presented during the September meeting held in Berlin . 4 of these were complete and 28 partial.
Discussion of these 32 proposals continued in November with extended period of Q&A. The majority of time was spent discussing the 4 complete proposals now known by the names: MITMOT, TGnSync, WWiSE, and Qualcomm.

After the close of discussion and final remarks, there was a low hurdle vote conducted on the 4 complete proposals. Voters were asked to vote “consider” or “not consider” for each of the 4 proposals.
266 ballots were cast. with the percentage of those favoring further consideration shown as follows:

- MITMOT 47.4%
- TGnSync 73.7%
- WWiSE 64.7%
- Qualcomm 56.8%

Details of the voting are on the 802.11 member’s website and in the TGn minutes. (document 04-1437)

The threshold for further consideration was 25% and therefore all proposals have passed on to the next phase.

More detailed presentations and discussions will continue in the January 2005 meeting. It is also expected that elimination voting will begin. During elimination voting each voter will register their support for only one candidate and the proposal with the lowest level of support will be eliminated.

The cycle of presentation, discussion and voting will continue until there remains only one candidate. The remaining candidate must then achieve ratification where support from at least 75% of voting members is obtained.

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