| Project | **IEEE 802.16 Broadband Wireless Access Working Group** |
|---|---|
| Title | **Session #5 Minutes for Sub10 Study Group – Richardson, TX** |
| Date Submitted | **2000-03-03** |
| Source | Brian G. Kiernan         Voice: (610) 8787-5637 <br> InterDigital Communications Corp.    Fax:(610) 878-7842 <br> 781 Third Ave.             E-mail: brian.kiernan@interdigital.com <br> King of Prussia, PA 19406 |
| Re: | This contribution provides the minutes of the 802.16 Sub10 Study Group for session #5 |
| Abstract | 802.16 Sub10 Study Group minutes for session #5 |
| Purpose | Review and approval. |
| Notice | This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
| Release | The contributor acknowledges and accepts that this contribution may be made public by 802.16. |
| IEEE Patent Policy | The contributor is familiar with the IEEE Patent Policy, which is set forth in the IEEE-SA Standards Board Bylaws <http://ieee802.org/16/ipr/patents/bylaws.html> and includes the statement: <br><br> "IEEE standards may include the known use of patent(s), including patent applications, if there is technical justification in the opinion of the standards-developing committee and provided the IEEE receives assurance from the patent holder that it will license applicants under reasonable terms and conditions for the purpose of implementing the standard." <br><br> See <http://ieee802.org/16/ipr> for details. |

# IEEE 802.16 Sub10 Study Group Meeting Minutes, Session #5
## Brian Kiernan, Chair
## InterDigital Communications Corp.

## Monday 1/10/00 Evening Session

The meeting was called to order at 7:00 PM with 88 people present.  After introductions, the Chair opened with a description of the objectives of the Study Group as defined in 802.16 Session #4 and the questions that the Study Group had to address:

(a) Is there a need for an Air Interface Standard for <10 GHz BWA?
(b) If the answer to (a) is yes, how should this activity merge with current 802.16 activities?
(c) Which frequency bands should the group address?  Are there specific bands?
(d) Is there duplication with other Standards Development Organizations?

Comment – There is a tradition in 802 that one MAC is one working group.
Chair Response – The intent is to have a common MAC with 802.16.1, if possible. Comment – Is this group going to be separate from 802.16 or not?
Chair Response - This needs to be determined. The Study Group could give a recommendation to start a separate group from 802.16, if desired.

The Chair then introduced the following series of presentations:
**FWA Systems at 3.4 GHz, Rebecca Chan - Industry Canada**
**MMDS in Canada - Phuong Vu - Industry Canada**
**Sub10 Market, Steve Winslow - Alcatel**
**Other Standards Efforts, Brian Kiernan - InterDigital**
**MMDS, Sanjay Moghe – ADC**
**Wireless Communications Association, Andrew Krieg– WCA**

Details of these presentations, including Q&A, are in Appendix A

The Chair thanked the presenters and restated the fundamental question posed to the Study Group, "Do we standardize?" or conversely, "Why should we not standardize?"
Comment - We can't standardize because the results will be sub optimal.  In looking at such a wide spectrum of requirements, then it will be sub optimal.
Chair - Not necessarily true because could just standardize on a specific area such as MMDS
Comment - We have not addressed the existing requirements – like the services?
Chair - This group could modify the current systems requirement document.
Q: Is a standard required if there are just two service providers within a given market?
Comment - Two years ago, a number of people were developing wireless services for voice, - by the time this group sets the technologies, no one could sell the system.
Comment - A standard air interface is not necessarily the absolute best technology.
Comment - Foresee the success of 802.11 with 11 Mbps PHY with an exponential increase in market potential.
Roger Marks - The 802.11 standard isn't necessarily obsolete, it modified itself until it was successful.
Comment - 802.11 is different because it offers products at Radio Shack.  This group is looking at products purchased by large customers.
Roger Marks - 802.16.1 did not do a marketing study on the functional requirements document.  It was created by inputs from various companies and individuals.
**The Chair then posed the Question:  "Does anyone believe that 802.16 should not standardize on air interfaces below 10 GHz?"  There were 3 objections, no abstentions.**

Based on this affirmation, it was decided to continue the Study Group discussions on the following day for preparation of a PAR.  The meeting was recessed at 10:15 PM.


# Tuesday 1/11/00 AM session
The meeting was called to order at 8:30 AM.  The Chair presented the PAR contribution (80216sub10-00_02) and solicited comments as the draft underwent a line by line review.
Discussions:
Demos Kostas – Ideal for PAR should be broad rather than narrowing down at this point.  Sub 10GHz is fine for now.  Should not limit the bands at this time.
 1. Sponsor Date: 2000 Feb xx
 2. Assigned Project Number 802.16.x
 3. PAR Approval Data Expected 2000 Mar 10 (expected)

Roger Marks – If this is a supplement to an existing standard, then use letters, if it is a new standard, then it is a number.
Roger Marks – Do an amendment by trying to leverage as much as possible from 802.16.  Supposition is to leverage as much as possible and then if it is different then can change the PAR to be a new standard.
Marianna Goldhammer – 802.11 has different numbers
Comment - 30% of the people in the US will not have broadband access using wired products, larger in the International markets.
Chair – Standard is a technical document

**Comments from a MAC standpoint**:
Marianna Goldhammer – Feels that it should be a completely different specification than the 802.16.1 document
Brian Petry – An Enterprise MAC will be more ATM focused, consumer will be more IP focused.  We don't need to keep 90% of the 802.16.1 document.
Roger Durand – Feels that there is little potential difference in the MACs.
Roger Marks – We can have a few things that are different for the MAC.  Could also amend the MAC by putting in some options into the 802.16.1 document.  If you look at the 802.3 standard, it started from 10Mbps all the way to 1Gbps.
Chair - We need to decide whether this work is tied in with 802.16.1 or not.
Comment on Title: Should this cover 10.5 GHz as well?

**Licensed vs. Unlicensed**
Chair - The current assumption is that this will be used for licensed bands vs. unlicensed.
Demos Kostas – Disagrees because it is good to use standard approaches in an unlicensed band.  If there is a common standard, then the benefits apply to both markets.
Roger Durand – We shouldn't want to restrict ourselves and should not have a licensed vs. unlicensed band.  Another way to look at this is to solve a problem of broadband access with range greater than 5 km.
Jose Costa – We should make a decision of unlicensed or licensed bands.  It is important to understand this at this time.  A standard for the unlicensed band will be different and have spectrum etiquette etc.
Comment - There are a few bands below 2.5GHz that are unlicensed.
Comment - MCI is using 2.1GHz.  Jackson using the WCS band.
Marianna Goldhammer – Suggested "Frequency bands dedicated for fixed outdoor two-way operation – between 1 and 11 GHz"

**Scope of Proposed Project**:
Revision to contribution: "This standard specifies the physical layer and media access control layer of the air interface of interoperable fixed point-to-point broadband wireless access systems.  The specification enables transport of data, video and voice services.  It applies to systems operating below 11GHz."
**This revision was accepted by voice vote**.

**Purpose of Proposed Project**
Revision to contribution: "Utilization of frequencies below 11 GHz will address a market that includes residences, Small Office-Home Office (SOHO), telecommuters and Small and Medium Enterprises (SME)."
**This revision was accepted by voice vote**.

**Intellectual Property**

The Chair pointed out that the PAR asks, "Are you aware of any patents relevant to this project?" and requested companies to make early disclosure of any potential IPR. Two individuals answered that their companies may have potential IPR.

**Supplement vs. new standard**

Roger Marks – There is significant commonality between this PAR and the current 802.16.1 PAR. This could be a supplement. The supplement can be even longer than the original document. Recommended the supplement approach as an 802.16.1a PAR vs. an 802.16.3 PAR. It is much easier to change from something that is similar and then split into another group.

**The Chair called for a vote on this matter by show of hands:**

**Favor of 802.16.1a – 8; Favor of 802.16.3 - 24.**

**The Study Group agrees that it will be a new PAR rather than an update of the existing 802.16.1 PAR.**

## Review of PAR Five Criteria

The Chair presented the contribution draft and a line by line review was done.

A Global edit from 10 to 11 GHz was agreed upon.

Comment on Distinct Identity – This is addressing a different target market than 802.16.

Comments on Unique solution – Discussion on use of the term "common MAC" or "common elements".

**The Chair called a vote by show of hands:**

**Favor of "common MAC" - 25, Favor of "common elements" - 7.**

"Common MAC" remains.

## Preparation of Recommendations for Working Group

The Chair proposed a set of recommendations. These were revised to the following:

1. That 802.16 pursue standardization of Air interfaces for frequencies below 11 GHz
2. That the sub10 PAR be forwarded to the IEEE 802 executive committee
3. That a separate PHY Group be established within 802.16, to include its own coexistence group
4. That the existing systems requirements group create a separate systems requirements document for sub10
5. That a separate sub10 MAC group be established

**The Study Group accepted these recommendations by acclamation with no objections**.

George Fishel, Chair of the Systems Requirements Task Group indicated his willingness to chair a sub10 systems requirements drafting group to review the current 802.16.1 specification in light of the sub10 markets. Brian Petry volunteered to be the editor of this document.

The Chair then informed attendees that the previously scheduled evening session would be held to insure that interested 802.16 members unable to attend the morning session could review the output. The meeting was recessed at 12:15 PM.

# 1/11/00 Evening Session

The meeting reconvened at 7:00 PM with 87 attendees. The Chair informed the attendees that the primary purpose of the meeting was to review the work done earlier in the day and to reach maximum consensus on the documents prior to presenting them to the 802.16 plenary meeting on Friday.

Roger Marks – Were these documents subjected to a formal vote?

Chair – Yes, all passed with the 75% approval required in 802 meetings.

The Chair then presented the draft PAR prepared in the morning session pointing out the differences from the original contribution.

**Project Number: 802.16.3 – A separate number rather than 802.16.1a**
Roger Marks – It is a separate independent PAR and this will clarify the differences.


**Title changed to "11 GHz" from "10 GHz"**
Chair - This is due to activity in Europe in the 10.5 GHz band.
No comments.


**Describe this Project**
Chair – This is a new standard rather than an amendment to an existing standard.


**Scope** – Changed to **"below 11 GHz."**
**Purpose** – revised to **"below 11 GHz"** and added "**Small and Medium Enterprises (SME)**"


Chair – Comments anyone?
Comment - The real distinction is not the under 10GHz but the low antenna is more distinctive than the frequency
     range.
Comment – Strongest thing in this part is the different market that is addressed.  Maybe the PAR should be
     modified to reflect target markets.
Chair – That is in the Five Criteria and not in the PAR
Comment – Any lower limits to the 11 GHz?
Chair – The group felt that there were a number of bands that are available and this should be decided as a part of
     the process rather than eliminate anything in the PAR.
Comment - Does this PAR address the unlicensed bands?
Chair – The original document was licensed bands only.  This change expands it to include unlicensed.
Comment - Recommend that there should be liaison relationships
Q: Jay Klein - What was the motivation for moving to a completely new standard?
A: Chair - In the meeting there was a fair amount of concern about the 802.16.1 MAC - if it would be capable of
     handling the requirements in this space.  The key is that the group didn't want to tie the requirements directly to
     the 802.16.1 MAC.
Comment – by supporting both the licensed and unlicensed bands, there will be different requirements.  Why
     support unlicensed bands?
Chair – This group will be contribution driving just like dot 1.  If in the course of the process, there is no input on
     the unlicensed band, than it will fall by the wayside by itself.  If people feel strongly about it, then you need to
     worry about the issues in the unlicensed band.
Comment – Is the focus in the unlicensed band or licensed band?
Chair – This will depend on the contributions. The intent of the group is not to preclude anything right up front.
Roger Marks – This is still a study group meeting and not being presented as something the group accepts or
     rejects.
Roger Marks – Explain section 9 – about no international participation.
Chair – The standard being pursued in T1P1.4 is not an international standard.
Roger Marks – It is not only because it is regional, there are other reasons.
Chair – The particular effort is USA only and has no participation by any international body.  It is also based
     solely on a circuit switched network.
Roger Marks – The PAR doesn't say that we are not doing circuit switching.
Chair – I believe circuit switching is outside of the 802 architecture.
Roger Marks – I feel that the PAR is too vague and doesn't have parallel structure.
Demos – Doesn't feel we lose anything by dropping this sentence.
**Sentence about T1P1.4 spec not being international dropped by acclamation.**


Comment – Where does the lower band stop?  Suggestion – 2GHz.
Chair - It is difficult to pick a number. Does anyone have a specific lower limit to the frequency range to put in the
     document?
No comments.
Comment - There is a lot of overlap with ETSI BRAN and HiperLAN plus 802.11. Section 9 should make
     mention of these.
Marianna Goldhammer - Questions why we should consider ETSI BRAN and HiperLAN because they are LAN
     based standards.

Jay Klein – HiperAccess is mainly focused on higher frequencies but there is a clause stating that they may consider lower frequencies.

Demos Kostas – feels that we don't have to worry about this now.  Who thinks we should put something in mentioning these various standards?

Roger Marks - This needs to be reviewed by the 802 executive committee and then the IEEE standards board and they want to know how this affects their work.


**Additional words for Section 9:**
**HiperAccess – The ETSI HIPERACCESS project is currently focusing on frequencies around 40 GHz but may evolve to frequencies below 11 GHz.**
**IEEE 802.11 utilizes similar frequencies but addresses different applications.**
**ITU-R Working Party 8F is developing air interfaces for IMT-2000 and access systems beyond IMT-2000 for both mobile and fixed applications.**
**The Group accepted these changes by acclamation.**


Comment – Shorten T1P1.4 to the same length as the added statements.
Jose Costa – Change scope – Primarily 2.5-11 GHz but can be used under 11 GHz.
The group rejected this change.
Roger Marks – Since it says that this covers frequencies under 11 GHz, the PAR may be rejected because there are so many other standards covering under 2 GHz.
Comment – When this group was first formed, the focus was MMDS and maybe 3.5 GHz, now it has expanded after the group has taken a closer look at other possibilities.


**Data Rates**
Roger Marks – Where are the data rates mentioned in this PAR?
Comment – the group has a set of data rate numbers.
Willie Lu – Support Roger's comment about data rates.  Should state these.
Naftali Chayat – Suggests stating Multi-Megabit data rates.
Demos Kostas - Suggests that scope state: Systems that support data rates above X Mbps.
George Fishel – Broadband is replacing the wired loop – should be anything greater than 4 KHz, or how about higher than ISDN.
Roger Durand - Air Interface should be greater than 10 Mbps.
Dave Sumi – 802.16.1 doesn't make any mention about data rates.
Comment – Standard definition of broadband is about 2 MBPS, we can use this.
Jose Costa – Definition of broadband is in the Functional Requirements Document: Broadband wireless access is where the data rates are higher than the primary rate – 2Mbps.
Chair – IEEE doesn't define broadband in the terms we are talking about.  In my mind, the primary competition is not fixed wireless; it is 3G wireless data.  Lower bound should be in the vicinity of the upper bound for 3G wireless, 2 MBPS.
Arun Arunachalam – If 802.16.1 doesn't have data rates, why do we need to include these here?
Chair – The reason is to distinguish this effort from those in other parts of the world.
**Addition to Scope: "(i.e., support data rates above T1/E1)". Accepted by acclamation.**


Comment – Should we put some specific mention of bands such as MMDS and 3.5 GHz but not excluding other areas?  Instead of primary focus, can we mention in the context of the services and frequencies?


**Completion Date**
Roger Marks – Target completion date.  Did everyone agree to this date?
Naftali Chayat – July 97 start and approved in Mid 99 for 802.11 B and A – Took a bit over 2 years to do a final completion of the standard.
Roger Durand – In my experience, it takes 3 years.  Suggest something like 3 years from the next plenary.
Comment – 802.16.1 plan – 2 years to the deadline and the group is on schedule or ahead of schedule.


**Motion: Roger Durand – Modify scope to specifically limit the bands to 2.1 GHz to 5.8 GHz.**
**Second: Shawn McCann**
Discussion:  Marianna Goldhammer – Would like to have 2-11 GHz.
Roger Marks – Focuses on frequencies.

Friendly amendment: Change to "from 2-6 GHz." Amendment accepted.

**Revised Motion: Roger Durand - Strike the wording "below 11 GHz" and replace with "from 2-6 GHz"**

No discussion

**Vote called: Favor 26, Opposed 13, Abstain 10**

**Motion fails**.

Roger Marks – On what grounds does the current draft stand?  None.  Until it is accepted, you have to go by the majority.  Is this a procedural or technical change?  Procedural is majority and technical requires 75%.

Chair - The current document was accepted by the group this morning.  I consider a change in scope to be a technical change requiring a 75% vote.

**Motion: Remi Chayer - Modify the previous motion to add: "but is broadly applicable to all frequencies below 11 GHz."**

**Second: Demosthenes Kostas**

**Proposed sentence: "It applies to systems operating between 2 and 6GHz but is broadly applicable to any frequency below 11 GHz."**

Friendly amendment: Roger Marks – to change "below" to "up to".  Amendment rejected

Discussion: None

**Vote called: For 40,Opposed 1, Abstain 0**

**Motion passes.**

**Motion: Brian Petry - Change the date to 2002**

**Second: Jung Yee**

**Motion: Nafatali Chayat - Amend the previous motion date to 2003 Mar 31**

**Second: Marianna Goldhammer**

**Vote called on amendment: Favor 7, Opposed 25, Abstain 9**

**Amendment fails**

**Question called: Brian Petry:**

**Passed**.

Friendly amendment: Jose Costa - To change the date to 2002 Mar 31

Second: Demosthenes Kostas. Change accepted by motioner and seconder.

**Vote called: Favor 50, Opposed 0, Abstain 0**

**Motion on the floor as amended: Revise Completion date to 2002 March 31**

**Voice vote: all Ayes, 0 nays, 0 abstains**

**Motion carries:** Completion date changed to 2002**.**

**Motion: Brian Petry – To accept the PAR as it is written as an output of the Study Group to move forward into the Working Group.**

**Second: Demosthenes Kostas**

**Vote: Favor 47, Opposed 0, Abstain 1**

**Motion Carries:** PAR accepted by the Study Group

## Five Criteria

**1a) Broad sets of applicability**

Roger Marks – Change WorldCom to MCI WorldCom (Minor change)

**Motion: Demosthenes Kostas - Delete the sentence that states companies, specifically MCI and Sprint.**

**Second: Roger Marks**

**Vote: No objections.** Sentence deleted**.**

Roger Marks – Change MMDS to MDS to reflect the changes in the PAR

**1b) Multiple Vendors and Numerous Users**

Roger Marks – Change "two companies are wireless trade associations" to "one company is a fixed wireless access trade association representing many more companies."

No objections.  Revisions made.


**Distinct Identity a)**

**Motion: Brian Petry –to accept the Distinct Identity "a) Substantially Different from other IEEE 802 Standards" paragraph as it stands**

**Second: Demosthenes Kostas**

Friendly amendment: Roger Marks - to make minor editorial changes adding frequency and RF bandwidth, and change Access Systems to lower case.

Accepted by Brian and Demosthenes

Friendly amendment: Reza Arefi - remove millimeter wave.  Accepted

Friendly amendment: Jose Costa – to change to state that this fills the gap between wireless LAN and LMDS applications.

Chair: requests specific wording.

**Question called: Roger Durand**

**Second: Duane Mortensen**

**Question passes on unanimous voice vote.**

**Vote on Motion as amended: Passed by unanimous voice vote**


**Distinct Identity b)**

Comment - Suggested wording change to include a statement on 802.16 MAC.  Every effort will be made "to utilize the 802.16.1 MAC or applicable elements thereof."

**Motion: Demosthenes Kostas - to accept b) statement as is.**

**Second: Marianna Goldhammer**

**Passes on unanimous voice vote**.


**Distinct Identity c)**

No comments.


**Motion: Brian Petry –to accept the whole document as it stands**

**Second: Demosthenes Kostas.**

Friendly amendment: Roger Marks – Appendix A; xx participants (from yy companies) attended the January 10-11, 2000 meeting in Richardson, Texas.  Amendment accepted.

**Vote to accept the document as revised: Unanimous voice vote for approval.**


**Study Group Recommendations to the Working Group**

The Chair presented the Recommendations as developed in the morning session.  A number of revisions were made to the proposed recommendations before formal voting occurred.


**Motion: Brian Petry – To delete Recommendations 3 and 5**

**Second: Demosthenes Kostas**

**Vote for Acceptance: Unanimous voice vote**. Recommendations 3 & 5 deleted


**Motion: Roger Durand –to accept the document as is**

**Second: Demosthenes Kostas**

Friendly amendment to revise Recommendation 1 to state "as specified in the proposed PAR."  Amendment accepted.

**Vote for Acceptance: Unanimous voice vote.**


**Motion: Brian Petry – that an Ad Hoc group be established to initiate writing of a Functional Requirements Document.**

**Second: Marianna Goldhammer -**

**Vote for Approval: Unanimous voice vote**.

Roger Marks  – In accordance with the 802 rules; the Study Group chair can create any committees.
The Chair then appointed George Fischel as Chair of the Sub10 Requirements Ad Hoc and Brian Petry as
   document editor.
The meeting was adjourned at 11:00 PM.

# Appendix A
## Details of Sub10 Study Group Presentations

## Presentation: FWA Systems at 3.4 GHz, Rebecca Chan - Industry Canada

Major points:

Canada allocated 3400-3700 for fixed wireless in July of 1998.

FWA Channel Plan – TDD is allowed but paired bands were allocated.  The lower sub band is allocated in 25MHz blocks. If FDD is used, there are recommended blocks of 50 and 100 MHz separation. If TDD is used, then Block F is preferred.

The maximum EIRP is 32dBW per RF channel.

Antenna characteristics need to be defined for the subscriber but omni-directional is assumed for the base station.

Licensing for urban areas is not allowed at this time.

The 3500-3700 MHz band requires coordination with existing point to point systems.

Equipment needs to be type approved in RSS 192.

See document Sp3400 on the web at www.strategis.ic.gc.ca

Q: Are you considering IP related services?

A: At the time this was written it was based on telephony; private systems are allowed.

Q: Why 25 MHz blocks?

A: These were the systems available at the time.

Q: What is the statement of coordination?

A: You need to coordinate with existing systems.

Q: What how where the block preferences established?

A: This was designed to allow for sharing information.  This is a guideline but if there is sufficient demand, other blocks can be assigned.

Q: Is this band available in other countries?

A: No comment.

Audience comments: CITEL opened up 3.4-3.7 GHz with 50 MHz blocks; China and other Asian countries are following the European market; A lot of other countries, except for the US, have adopted this band for fixed wireless.

## Presentation: MMDS in Canada - Phuong Vu - Industry Canada

Major Points:

1985    MCS - Sixteen 6 MHz channels (2500-2596) for telecom; MDS - Fifteen 6 MHz channels 2596-2686 MHz for broadcast

1993-1995

Issue permits to LookTV in Ont/Que and SkyCable (Man) and Image Wireless (Sask) are licensed and in commercial operation.

SRSP 2nd issue

States the technical requirements for MCS in the fixed service. Includes one-way and two-way video and data.  Covers the Bands. General – Used for point to point and point to multipoint systems. Require technical acceptance certification. IC information on technical parameters of hub and point-to-point stations made available to licensees.

MCS – one way and two way is permitted.

Q: Can the band be aggregated any way you want?

A: Yes

ITU Recommendations - Currently looking at 3.5 GHz and there are recommendations.  There are CDs available for Fixed Wireless access in this area.

## Presentation: Sub10 Market, Steve Winslow - Alcatel

Major Points:
Applications: SOHO, High End Residential, Other Applications – Internet
MMDS important in the US
Various bands available in Canada as well as 3.4 GHz
Other bands in 3.4-3.6 – CEPT countries - Germany, France, UK
Unlicensed bands – possible but there could be issues with lack of coordination.
Cost – Commonality of equipment helps lower cost.

Q: When you talk about SOHO, it could be millions of units designed to operate under 10 GHz – will work in the lower bands cannibalize the higher frequency markets?
A: It could but most of the higher frequency products are for higher speeds.
Q: Can you comment on the feasibility of standardizing all bands available?
A: No.
Comment by Chair: It might be possible to standardize other bands.  In the USA, 3.5 GHz is a DOD band for ship-borne radar.  The US wants Navy ships to be able to go anywhere in the world and turn on their radar, so they oppose FWA in this band.

Q: What is the purpose of the UN-II band?  Designed for Internet access?
A: No.  It could be used for any kind of unlicensed access.  Foreseen that it could be used for in-building, access to public buildings, etc.
Comment – Dave Sumi – The vision for UNII – 3 bands; low – LAN; middle – Campus; high - for wide area. Band is open to everything.
Q: Should we cover the 5.8GHz band?
A: We should consider this band as well.
Q: Is the 2-10GHz requirement enough to do a general specification for all of the bands?
Chair – essentially, nothing prevents anything in a licensed band from being used in an unlicensed band.

## Presentation: Other Standards Efforts, Brian Kiernan - InterDigital

Major Points:
TIA TR45.4 – FWA work was abandoned due to lack of interest.  This is primarily a mobile group.
T1P1.4 – under ATIS, mainly involved in GSM mobile. A small, but active, group is addressing FWA for PSTN Access – oriented towards classical Circuit Switched Services (ISDN, Fractional T1/E1).  Highest data rate in any T1P1.4 documents is 2 MBPS.
ETSI TM4 – They are not standardizing the air interface – conformance and coexistence standards only
ITU-R – Activities are ongoing under JRG 8A/9B, with whom we already liaison
It looks like this group is unique right now.

Audience comment – Sees this group as a Public Network Access solution and does not really conflict with 802.11 because it is a shorter range spec.  There are considerable differences between the two.
Roger Marks – It isn't really an issue to have two different groups but would like to have coordination between the two.
Audience commenter (same as before) - There are a number of people using the 802.11 MAC for an outdoor environment?  Not going to create an industry in an unlicensed band.  The key is to facilitate an industry.
Mariana Goldhammer – 802.11 is for wireless LAN.

Other comment – there is a complete difference in the level of service provided.  The 5.8 GHz is available right now, especially for non-major metropolitan environments.

Roger Marks – Nothing prevents a standard to be used within a different frequency band.  The key is whether or not we address the needs of a different band.  Need to look at the specific requirements and see how you can accommodate multiple bands.

Break 15 min.

## Presentation: MMDS, Sanjay Moghe – ADC

Major Points:
High-speed wireless services using two-way wireless systems
Why use MMDS?  Low deployment cost $200 CPE
Systems Considerations
Data, voice and video, symmetric traffic is required
Common Deployment scenarios
  Not all subscribers will have a pristine receive signal
  Foliage and Terrain Blockage
  Reflections from station or moving objects
MMDS Deployments – will happen

Q: Have you done any channel modeling?
A: Used some product in the lab using an HP Multipath analyzer.  Also did some outside testing in Pittsburgh, many hills and blockage.  If it can work in Pittsburgh, it can work in other places.
Q: Are there any multi-cell trials?
A: No not right now
Q: Done any 64QAM deployments with intercell interference?
A: We have deployed multiple sectors and have seen interference from one cell to another.  Single cell 64QAM deployed in many cities.  500ft towers and transmitting 10s to 100s of Watts.
Q: Cost of residential units?
A: $500-700 for a CPE.
Q: Tested with low antennas?
A: No.
Q: Marianna – Comparison between MMDS and LMDS markets?
A: LMDS to get to residential will take some time because of cost.  MMDS already has a low cost and is coming down fast.

## Presentation: Wireless Communications Association, Andrew Krieg – WCA International President and CEO

Major Points:
WCA and BWA Sitting on a Rocket

Major Broadband Wireless Access Rollouts powered by huge demand for bandwidth and the limitations of alternatives
WCA represents Fixed Terrestrial Wireless Broadband Worldwide - LMDS, MDS, WCS
Mission – promote the growth of BWA in US and Internationally
Technical Initiatives:
  Chairman George Harter (george@haa.com)
  Standards Task Force Chairman Reza Arefi rarefy@sfinet.com
  IEEE 802.16 Liason Demos Kostas dkostas@adaptivebroadband.com
BWA:  It's already Fixed Satellite and Wired, 3-G Proponents Have Long Prepared and Lobbied Regulators, Markets

Fixed BWA - Late on Scene, relatively modest presence, but with major efficiency advantages.
3G would like to use 2.5 GHz for mobile broadband wireless.
Regulatory Problems – Delays by regulators, poor policies (e.g. tiny band allocations)
Incumbents Thwarting Competition – Access issues (FCC's Competitive Networks Proceeding)

Q: Roger Marks – Fixed wireless is treated as an industry. Should IEEE do the same thing? Can you give us a view from the WCA to look at the commonality from a standards point of view?

A: Andrew feels it is important to look at this band. It is important to emulate what has happened in LMDS within this group.

Q: In the US with MCI and Sprint spending $1B for spectrum, when they pick their equipment, won't this be a defacto standard?

A: Quite possibly. Focus is always on the band used for service but backhaul is also important to make the backend grow. Another reason for WCA focus on multiple bands is that satellite companies are squeezing backhaul bands. WCA builds alliances with people that use these bands to help in efforts to protect the bands.

Q: Can you talk about line of sight as a requirement?

A: Line of sight is usually a requirement - can use repeaters, taller towers and other ways to get around this depending on cost. Line of sight problems have to do with regulations that are USA oriented and don't exist in other parts of the world. In other countries you can run a bit of wire in certain parts and then wireless but you would need a cable franchise to do this in the US.

Sanjay Moghe – most deployments are line of sight.

Audience comment – Line of sight depends on if you are trying to go through foliage or dry wall? There are new methods that allow penetration through dry wall.

Q: WCA effective in public policy – what are the major initiatives as regards public policy?

A: Major efforts – World Radio Conference, APT Asia Pacific Telecom council – trying to work on spectrum harmonization. The same things are happening in millimeter wave issues as well. Our other priority is access through competitive access meetings. WCA's position – all companies want the service providers to have access to the customers. Look from the regulator's prospective to make progress.