Session #46 802.16 relay TG Session Summary

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Mitsuo Nohara
Relay TG Chair, KDDI Corp.
3-10-10, Iidabashi, Chiyoda-ku, Tokyo 102-8460 Japan

Voice: +81 3 6678 3599
Fax: +81 3 6678 0219
E-mail: mi-nohara@kddi.com

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Purpose:

TG Meeting organization

Session #46 802.16 Relay TG
Session Summary

4th Task Group Meeting on Multi-hop Relay in IEEE 802.16

Relay TG Chair Mitsuo Nohara

Vice Chair Peiying Zhu

Technical Editor/Secretary Jung Je Son

Technical Editor Mike Hart

IEEE802.16 Relay TG Meeting

13-16 Nov., 2006, Dallas, Texas, USA

* This document is for information only. In case of any mismatch with the minutes, the minutes supersedes.

Objectives of this 4th TG Meeting

- **To advance the development of the P802.16j Baseline Document (IEEE802.16j-06/026)**
  - **Through the Technical Contributions presentation and discussion,**
  - **Considering the five Guideline Documents of:**
    - **Usage Models (IEEE802.16j-06/015),**
    - **Definitions and Terminology (IEEE802.16j-06/014r1),**
    - **Evaluation Methodology (IEEE802.16j-06/013r1),**
    - **Technical Requirements (IEEE802.16j-06/016r1) and**
    - **Table of Contents (IEEE802.16j-06/017r2).**
- **To prepare for the draft standard towards the next meeting.**

Agenda-1

Motion 1: to approve the agenda,

1st: Mike Hart, 2nd :Wen Tong, Motion passed with no objection, 16:30

5. **Session #45 802.16 Relay TG Minutes Review**

(IEEE 802.16-06/028)

Motion 2: to approve the minutes,

1st: Wen Tong, 2nd: Panyuh Joo, Motion Passed with no objection, 16:32

Agenda-2

2. Meeting Organization Discussion

Motion 3: to change the wording on Section 4 Title "Text Proposals for the Baseline Draft,"

1st: Naftali Chayat, : motion failed

(result taken in the minutes separately)

Agenda-3

3. **Technical Contributions Presentation and Discussion,**
   * in reply to the call for Technical Proposals (IEEE 802.16-06/027) on:
   - P802.16j Baseline Document (IEEE802.16j-06/026)

   * considering the five guideline documents of:
   - Usage Models (IEEE802.16j-06/015),
   - Definitions and Terminology (IEEE802.16j-06/014r1),
   - Evaluation Methodology (IEEE802.16j-06/013r1),
   - Technical Requirements (IEEE802.16j-06/016r1) and
   - Table of Contents (IEEE802.16j-06/017r2).

   * with the presentation order as attached.
- **Text Proposals for the Baseline Draft.**
- **AOB**

Technical Contributions

- **Call for Technical Contributions by 7 Nov., 2006**
  156* Contributions submitted,
  associated with Presentation Materials and Commentary.
  *** revisions not double-counted.**

- **Contributions Presentation during this session:**
  - **Provision of the following information requested:**
    - **Key Feature**
    - **Usage Model and/or Technical Conditions applied (e.g., BS-MS link required, Centralized and/or Distributed Control, etc.,)**

Topics and Presentation Order

1. Relay concepts (8)
2. Frame structure (24) (Total: 31)
   - Sync & identification (5)
   - MAP (2)
- Network entry / Connections & addressing (26 / 8) (Total: 34)
   - Including: Initial ranging
- BW request (6) (Total: 6)
- Construction & transmission of MAC PDUs (4) (Total: 6)
   - ARQ (2)
- Measurement & reporting (7) (Total: 7)
- Mobility management (Total: 34)
   - Handover (16)
   - Routing & path mgmt / Neighborhood discovery (10 / 1)
   - Idle/Sleep mode (2 / 4)
   - MBS (1)
8. RRM, Scheduling & Interference control (4 / 2) (Total: 6)
9. PHY (Total: 12)
   - HARQ (4)
   - Power control (3)
   - Modulation & coding (2)
   - AAS / MIMO (1 / 2)
- Others: (Total: 5)
   - Definitions (1)
   - Evaluation methodology (4)

1. Relay concepts

No.	Title	Author 1	Affiliation	Category
127	A Proposal for combined A&F and D&F relaying	Junichi Suga	Fujitsu	Relay concepts
130	A proposal for introducing a shared RS system in MR	Keniichi Nakatsugawa	Fujitsu	Relay concepts
132	Relaying methods proposal for 802.16j	Masato Okuda	Fujitsu	Relay concepts
160	Support for a Simplified Uplink-Only Relaying Mode	Philippe Sartori,.	Motorola	Relay concepts
200	Cooperative Relay Protocol	D.J. Shyy	MITRE	Relay concepts
201	SMART Relay Alliance Proposal	Arnaud Tonnerre,	Thales (SMART)	Relay concepts
225	Directional Distributed Relay with Interference Control and Management	Yong Sun,	Toshiba Research Europe	Relay concepts
238	MMR Protocol Stack	Hang Zhang	Nortel, Institute for Information Industry	Relay concepts
235	Moving RS operation	Hang Zhang,	Nortel	Relay concepts

1. Relay concepts: Summary & Discussion Points

- 127: A&F concept for in-frame relaying
- 130: Shared RS (one RS to two or more BS)
- 132: Transparent & Non-transparent RS with connection mgmt @ MR-BS
- 160: Transparent UL relaying
- 200: Co-operative relay group concept (264, 273)
- 201: Smart relay (low complexity & enhanced → CC)
- 225: Directional distributed RS
- 238: Description of .16j protocol stack
- 235: Proposal to relay at CS for Mobile RS

2. Frame structure (1)

No.	Title	Author 1	Affiliation	Category
138	Frame structure for multihop relaying support	Mike Hart	Fujitsu	Frame structure
155	Proposal for Multihop Relay Frame Structure for 802.16j	Roger Peterson	Motorola	Frame structure
163	A Flexible Multi-hop Frame Structure for IEEE 802.16j	David Comstock,	Huawei	Frame structure
165	Proposal for Relaying Frame Structure	Fang-Ching Ren,	ITRI	Frame structure
174	A Usage Scenario and frame structure for out-of-band relay	Dae Young	SK Telecom	Frame structure
198	A Frame Structure for Multihop Relays	Adrian Boariu	Nokia	Frame structure
205	Relay Station Modes - design objectives of relaying frame structure	Kanchei (Ken) Loa,	Institute for Information Industry (III), Nortel	Frame structure
210	A MAC frame structure for IEEE 802.16j multihop relay networks	Peng-Yong Kong,	Institute for Infocomm Research	Frame structure
224	Dynamic Frame Structure for IEEE802.16j Relaying Transmission to Support Efficient Scheduling	Yong Sun,	Toshiba Research Europe	Frame structure
226	A Frame Structure Design for OFDMA-based Multihop Relay Networks	Jeffrey Z. Tao,	Mitsubishi Electric Research Lab, Mitsubishi Electric Corp	Frame structure
228	Do we need another frame structure for relaying?	Matty Levanda	WiNetworks	Frame structure
231	Airlink Frame Structures for Multihop Relay System	Michael Webb, Dale Branlund	BRN Phoenix	Frame structure
233	Frame Structure to Support Relay Node Operations	Peiying Zhu	Nortel	Frame structure

2. Frame structure (2)

236	A Flexible Multihop Relay Frame Structure for 802.16j	Qu Hongyun,	ZTE	Frame structure
249	Frame Structure for Flexible Resource Allocation	Aik Chindapol	Siemens	Frame structure
250	Hybrid Relay Structure within a Single Frame	Su Chang Chae	ETRI, SAMSUNG THALES	Frame structure
256	Frame Structure for 2-hop relay	Changyoon Oh,	Samsung Electronics, Samsung AIT	Frame structure
257	Frame Structure for multi-hop relay	Youngbin Chang,	Samsung Electronics, Samsung AIT	Frame structure
258	Frame structure for out-of-band relay	Youngbin Chang,	Samsung Electronics, Samsung AIT	Frame structure
260	Initial Relay region indicator	Hyunjeong Kang,	Samsung Electronics, Samsung AIT	Frame structure
263	Indication of changes in the offset of relay region	Hyunjeong Kang,	Samsung Electronics, Samsung AIT	Frame structure
275	Multi-phase frame structure proposal	Wendy C Wong	Intel	Frame structure
277	Multihop Relay frame structure	Xiaobing Leng	Alcatel	Frame structure
295	Multiple Frame Concept for MMR Operation	D.H. Ahn	ETRI, Kwangwoon University, Samsung Thales	Frame structure

2. Frame structure (3)

No.	Title	Author 1	Affiliation	Category
144	Relay midamble	Mike Hart	Fujitsu	Synchronisation & identification
150	Proposed modifications to the PN sequence used by the Base Stations and Relay Stations in a MR enabled network	Dorin Viorel	Fujitsu	Synchronisation & identification
199	Relay-Station Preamble Segment Assignment/Re-Assignment Scheme	Peter Wang,	Nokia	Synchronisation & identification
240	RS DL Synchronization and Radio Environment Measurement – Introduction of RS-Preamble	Hang Zhang,	Nortel	Synchronisation & identification
272	Transmission timing requirement of RS	Kyu Ha Lee	Samsung Thales, ETRI	Synchronisation & identification

No.	Title	Author 1	Affiliation	Category
157	MAP construction and transmission for a relay station	Mohsin Mollah	Motorola	Construction & transmission of MAP
182	Data Relay of RS in Relay System.	Sungcheol Chang	ETRI	Construction & transmission of MAP

2. Frame structure: Summary &Discussion Points

- Sync / Async (RS and BS preamble transmission time aligned?)
- Transparent / Non-transparent
  - Does transparent require changes?
- New preamble, midamble, postamble for relay link?
- Multi-zone approach (if change to .16e frame structure required from RS or MR-BS perspective):
  - 2 zones per subframe: Access & relay
  - More than 2 zones per subframe
  - Relative positioning of zones
- In-band vs. out-band (multiple radios)
  - In-band relay with single or multiple radio
  - Does out-of-band require new frame structure?
- In-frame relaying
  - Is it possible for A&F / D&F (due to processing time)?
- How to extend frame structure for multi-hop
  - Multi-frame / further zones
  - Does it require changes to two-hop structure in the standard?
  - Delay vs. overhead (due to subdivision)
- Support of multiple paths (i.e. RS connected to more than one BS or RS or vice versa)
- Implementation vs. Standardisation

2. Frame structure (1)

No.	Title	Author 1	Company	Comments
138	Frame structure for multihop relaying support	Mike Hart	Fujitsu	Multiple Zones for access and relay for trans-parent RS, Synchronous frame structure, no change for transparent relay, optional mid-amble in relay zone
155	Proposal for Multihop Relay Frame Structure for 802.16j	Roger Peterson	Motorola	Similar multiple zone concept, separate zone for access and relay to enable efficient relay design, standardize message, not actual structure. Synchronous frame
163	A Flexible Multi-hop Frame Structure for IEEE 802.16j	David Comstock,	Huawei	Multiple Zones for access and relay, different Zones for RS type 1 and 2
165	Proposal for Relaying Frame Structure	Fang-Ching Ren,	ITRI	Multiple Zones, asynchronous frame structure from MMR-BS and RS
174	A Usage Scenario and frame structure for out-of-band relay	Dae Young	SK Telecom	Frame structure for out of band relaying, may require changes on MS (?)
198	A Frame Structure for Multihop Relays	Adrian Boariu	Nokia	Multiple Zones synchronous Frame structure, Preamble in RS, comparison of asynchronous and synchronous frame structure
205	Relay Station Modes - design objectives of relaying frame structure	Kanchei (Ken) Loa,	Institute for Information Industry (III), Nortel	Summary of various RS types (scenarios) and design objectives

2. Frame structure (2)

No.	Title	Author 1	Company	Comments
210	A MAC frame structure for IEEE 802.16j multihop relay networks	Peng-Yong Kong,	Institute for Infocomm Research	Multiple Zones(4) arranged in sequential fashion (TDM), for Real/Virtual BS, 1st Hop RS, Relay Zone UL Burst, and 2nd Hop RS. It also proposes a superframe which consists of multiple frames
224	Dynamic Frame Structure for IEEE802.16j Relaying Transmission to Support Efficient Scheduling	Yong Sun,	Toshiba Research Europe	High level design principle with an example frame structure for transparent RS
226	A Frame Structure Design for OFDMA-based Multihop Relay Networks	Jeffrey Z. Tao,	Mitsubishi Electric Research Lab, Mitsubishi Electric Corp	Multiple Zones Asynchronous Frame structure
228	Do we need another frame structure for relaying?	Matty Levanda	WiNetworks	No need to specify a frame structure, instead, it should specify the MAC messages to control the frame structure.
231	Airlink Frame Structures for Multihop Relay System	Michael Webb, Dale Branlund	BRN Phoenix	Separate Relay Zone in DL subframe for both UL/DL relay, support multiple frame options
233	Frame Structure to Support Relay Node Operations	Peiying Zhu	Nortel	Frame structureMultiple Zone Asynchronous frame structure, Relay zone could be placed in UL to reduce the latency

2. Frame structure (3)

236	A Flexible Multihop Relay Frame Structure for 802.16j	Qu Hongyun,	ZTE	In frame relay for transparent RS
249	Frame Structure for Flexible Resource Allocation	Aik Chindapol	Siemens	Frame structure to enable co-operative diversity
250	Hybrid Relay Structure within a Single Frame	Su Chang Chae	ETRI, SAMSUNG THALES	In frame relay for transparent RS to support both AF+DF
256	Frame Structure for 2-hop relay	Changyoon Oh,	Samsung Electronics, Samsung AIT	Frame Structure for 2-hop relay with postamble. It is the same multi-zone concept
257	Frame Structure for multi-hop relay	Youngbin Chang,	Samsung Electronics, Samsung AIT	Frame Structure for multi-hop relay with postamble. It is the same multi-zone concept except relay zones occur in multiple frames
258	Frame structure for out-of-band relay	Youngbin Chang,	Samsung Electronics, Samsung AIT	No Frame Structure change needed
260	Initial Relay region indicator	Hyunjeong Kang,	Samsung Electronics, Samsung AIT	An additional Map IE to indicate the initial Relay Zone
295	Multiple Frame Concept for MMR Operation	D.H. Ahn	ETRI, Kwangwoon University, Samsung Thales	Multiple frame Frame structure, potentially large delay

2. Frame structure (4)

275	Multi-phase frame structure proposal	Wendy C Wong	Intel	Multi-phase frame structure, similar to multi-zone concept except relay zones occur in multiple frames for multi-hop. Relay zone consists of a mid-amble.
277	Multihop Relay frame structure	Xiaobing Leng	Alcatel	Multiple zone frame structure for transparent or non-transparent, in-band and out-band, (not sure if it in frame or outframe relay).
295	Multiple Frame Concept for MMR Operation	D.H. Ahn	ETRI, Kwangwoon University, Samsung Thales	Multiple frame Frame structure, potentially large delay

2. Frame structure (5) - Synchronisation & identification

No.	Title	Author 1	Company	Comments
144	Relay midamble	Mike Hart	Fujitsu	Add an optional mid-amble in relay zone
150	Proposed modifications to the PN sequence used by the Base Stations and Relay Stations in a MR enabled network	Dorin Viorel	Fujitsu	Subdivide Preamble sequences into 2 sets, one for BS, one for RS so that RS can distinguish BS from RS
199	Relay-Station Preamble Segment Assignment/Re-Assignment Scheme	Peter Wang,	Nokia	Introduce a signalling/reporting scheme to enable automatic segmentation and CellID assignment
240	RS DL Synchronization and Radio Environment Measurement – Introduction of RS-Preamble	Hang Zhang,	Nortel	Network wise synchronized preamble for neighbourhood discovery
272	Transmission timing requirement of RS	Kyu Ha Lee	Samsung Thales, ETRI	RS synchronization requirement

No.	Title	Author 1	Company	Category
157	MAP construction and transmission for a relay station	Mohsin Mollah	Motorola	Construction & transmission of MAP (centralized and distributed MAP)
182	Data Relay of RS in Relay System.	Sungcheol Chang	ETRI	Construction & transmission of MAP

Comments (on the floor)

- Frame structure divides a frame into many zones, it should consider the following factor
  - Processing delay
  - UL power limitation, need to consider the short time duration to the link budget
- Flexibility is the key

3. Network entry (1)

No.	Title	Author 1	Affiliation	Category
124	MS Network Entry for transparent Relay Station	Masato Okuda	Fujitsu	Network entry
133	MS network entry for non-transparent Relay Station	Masato Okuda	Fujitsu	Network entry
139	MAC version encoding TLV for .16j	Mike Hart	Fujitsu	Network entry
142	Network entry procedure for transparent relay station	Mike Hart	Fujitsu	Network entry
143	Network entry procedure for non-transparent relay station	Mike Hart	Fujitsu	Network entry
154	Network entry procedure for MS in 802.16j	Mohsin Mollah	Motorola	Network entry
158	Routing Announcements for Network Entry Support	Shyamal Ramachandran	Motorola	Network entry
161	Relay Station Neighbor Discovery	Shyamal Ramachandran	Motorola	Network entry
167	RS Network Entry, Topology Establishment and Initialization for IEEE 802.16j	Chie Ming Chou	ITRI	Network entry
172	Ranging Process for IEEE 802.16j	Chie Ming Chou,	ITRI	Network entry
193	RS support for OFDMA Based Ranging	Shashikant Maheshwari,	Nokia	Network entry
206	Distinct OFDMA-based Ranging Code Sets for Relay Station and Mobile Station	Kanchei (Ken) Loa,	Institute for Information Industry (III), Nortel	Network entry
207	MS Network Entry with RS	Kanchei (Ken) Loa,	Institute for Information Industry (III)	Network entry

3. Network entry (2)

208	RS Network Entry	Kanchei (Ken) Loa,	Institute for Information Industry (III)	Network entry
211	A node entry process for IEEE 802.16j multihop relay networks	Yu Ge,	Institute for Infocomm Research	Network entry
232	Ranging in MMR System	Changkyoon Kim	Samsung Thales, ETRI	Network entry
234	Relay Grouping and PUSC Segment Selection for FCH/MAP Transmission	Hang Zhang,	Nortel	Network entry
241	RS 802.16e Preamble Transmission	Hang Zhang,	Nortel	Network entry
242	RS Configuration Description Broadcast	Hang Zhang,	Nortel	Network entry
243	RS Configuration Signaling	Hang Zhang,	Nortel	Network entry
246	MMR Cell Path Discovery, Link Maintenance and Data Forwarding	G.Q Wang,	Nortel	Network entry
247	Routing path list TLV for MMR cell topology discovery	G.Q Wang,	Nortel	Network entry
261	Relay-Assisted MS Network Entry	Aik Chindapol	Siemens	Network entry
276	Path selection for handover through RS	Kenji Saito	KDDI R&D Labs.	Network entry
278	Path selection for RS initial network entry	Kenji Saito,	KDDI R&D Labs.	Network entry
286	MS/RS Network Entry and Initialization	Shan Jin,	Alcatel, Research & Innovation	Network entry

3. Network entry (3)

No.	Title	Author 1	Affiliation	Category
156	Connections in a Multihop Relay Network	Shyamal Ramachandran	Motorola	Connections & addressing
170	Connection Identification and Transmission for Relay Support	Tzu-Ming Lin,	ITRI	Connections & addressing
171	Systematic relay station identification allocation and relay path configuration mechanism for IEEE 802.16j (Multi-hop Relay)	Yuan-Ying Hsu	Telecordia/ITRI	Connections & addressing
274	Proposal on addresses, identifiers and types of connections for 802.16j	Jerry Sydir	Intel	Connections & addressing
281	Management CID allocation	Kenji Saito,	KDDI R&D Labs., Samsung Electronics	Connections & addressing
282	Service flow management for RS	Kenji Saito,	KDDI R&D Labs.	Connections & addressing
289	RS Multicast CID for 802.16j	Mike Hart	Fujitsu	Connections & addressing

3. Network entry: Comments & Discussion Points

- When to inform BS of connecting node?
  - Considering latency issues
- How to divide stages between BS/RS
  - Depends on relay type
- Procedure modification for RS network entry?
- Changes to, or new messaging, to support:
  - CDMA ranging code, CDMA_Alloc_IE & RNG
  - New messages or reuse existing with new TLVs?
  - Impact on R-Link (overhead vs. benefit)
  - How to allocate CDMA code sets?
  - Building of routing table during entry?
- Negotiation & broadcast of parameters for network entry
  - What needs to be transmitted/negotiated?
  - How: DCD/UCD, SBC, REG?
  - Impact on extra signalling on overhead
  - Allocation of IDCell
- (Security)

3. Network entry (connections)

- Connections required to RS
  - Primary, basic, RS multicast, (secondary)
  - DL/UL
- CID allocation
  - At MR-BS or RS
  - Reservation of CID range for allocation by RS
  - Prime based or not

4. Bandwidth request

No.	Title	Author 1	Affiliation	Category
125	Fast Bandwidth request scheme for Relay Station	Masato Okuda	Fujitsu	Bandwidth request
137	Bandwidth request for non-transparent RS	Yuefeng Zhou	Fujitsu	Bandwidth request
147	Rate based bandwidth request mechanism	Wei-Peng Chen	Fujitsu	Bandwidth request
180	R-UL ranging control of RS within cell coverage	Sungcheol Chang	ETRI	Bandwidth request
188	Relay Support for Scheduling, Bandwidth Request and Allocation Mechanism	Haihong Zheng,	Nokia	Bandwidth request
189	Resource Request for Bandwidth	Yousuf Saifullah,	Nokia	Bandwidth request
215	Scheduling Service and Distributed Scheduling for 802.16j system	Yanling Lu,	Hisilicon Technologies	Bandwidth request
214	Dedicated Interface Between MMR-BS and RS	Byung-Jae Kwak,	ETRI	Connections & addressing

4. Bandwidth request: Comments & Discussion Points

- SS BW request/grant procedure for centralised and distributed allocation
  - How to divide procedure between BS and RS?
  - Staggering allocations?
- Modification of BW request scheme for RS:
  - Special code usage
  - Continuous allocation
  - Dedicated allocation (DCH) vs. Polling
  - Rate based request
  - Special codeword on CQICH to request BW
- Reclassification of BW request CDMA codes
  - Subset for RS usage (see network entry)
  - Associate with BW & MCS requested

4. Bandwidth request

No.	Title	Author 1	Company	Category
125	Fast Bandwidth request scheme for Relay Station	Masato Okuda	Fujitsu	Fast CDMA B/W request and continuous B/W allocation
137	Bandwidth request for non-transparent RS	Yuefeng Zhou	Fujitsu	Use the existing scheme and clarify the text
147	Rate based bandwidth request mechanism	Wei-Peng Chen	Fujitsu	Rate-Based Bandwidth Request Mechanism to reduce the B/W overhead
180	R-UL ranging control of RS within cell coverage	Sungcheol Chang	ETRI	Partition CDMA code into 2 set so that MR-BS can distinguish B/W request from RS and MS. Alternatively, use CQICH code word to do B/W requests
188	Relay Support for Scheduling, Bandwidth Request and Allocation Mechanism	Haihong Zheng,	Nokia	Bandwidth request (not quite understand the issue)
189	Resource Request for Bandwidth	Yousuf Saifullah,	Nokia	Separate code for B/W, initial ranging and periodic ranging (do we need this other than initial ranging)
215	Scheduling Service and Distributed Scheduling for 802.16j system	Yanling Lu,	Hisilicon Technologies	Distributed scheduling optimization by introducing a waiting period
214	Dedicated Interface Between MMR-BS and RS	Byung-Jae Kwak,	ETRI	Introduce dedicated control channel between MMR-BS and RS to reduce the latency

ARQ

- Do we need link by link ARQ?
  - If yes, do we need changes?
    - Introduction of error erasure correction code in ARQ?
- Co-operative ARQ ?
- Discuss with HARQ together
  - Interaction between ARQ and H-ARQ

5. Construction & transmission of MAC PDUs

No.	Title	Author 1	Affiliation	Category
178	Aggregation in 802.16j Enhanced Concatenation and Packing	Jeffrey Z. Tao,	Mitsubishi	Construction & transmission of MAC PDUs
237	A Proposal for Construction and Transmission of MAC PDU in 802.16j	Sean Cai	ZTE	Construction & transmission of MAC PDUs
239	R-MAC PDU format	Hang Zhang,	Nortel, Institute for Information Industry	Construction & transmission of MAC PDUs
254	Fast Connection Establishment and Maintenance with Relays	Aik Chindapol	Siemens	Construction & transmission of MAC PDUs

No.	Title	Author 1	Affiliation	Category
176	An Advanced ARQ Scheme (A2RQ) on Relay Link for 802.16j	Toshiyuki Kuze,	Mitsubishi	ARQ
213	An ARQ scheme for IEEE 802.16j multihop relay networks	Peng-Yong Kong,	Institute for Infocomm Research	ARQ

Construction & transmission of MAC PDUs: Comments & Discussion Points

- Concatenations rules between BS-RS and RS-RS link
  - Need for changes (including CRC)?
  - If there is needed change, how?
  - No changes of concatenations rules, need Clarifications
- Encapsulation
  - Is it required? If using encapsulation, is it needed to change GMH (General MAC Header) to reduce overhead.
  - Dependency on source routing, routing table or hybrid
    - Hop by hop encapsulation
    - Tunnel
    - Could be discussed with routing and network entry

6. Measurement & Reporting

No.	Title	Author 1	Affiliation	Category
145	Measurement method of the network congestion used for adjusting the radio resources in a MMR cell	Chenxi Zhu	Fujitsu	Measurement & reporting
148	Estimation of Initial Interference Matrix	Wei-Peng Chen	Fujitsu	Measurement & reporting
181	MS Channel Detection of RS in Relay System	Sungcheol Chang	ETRI	Measurement & reporting
202	End-to-End Throughput Metrics for QoS Management in 802.16j MR Systems	Ozgur Oyman	Intel	Measurement & reporting
204	Signature Identification for Multi Hop Relay	Adrian Boariu	Nokia	Measurement & reporting
248	R-link TLV for MMR relay link monitoring and reporting procedure	G.Q. Wang,	Nortel	Measurement & reporting
255	The 2nd fast feedback channel region to reduce transfer delay of fast feedback data for 2-hop MMR system	Ki Seok Kim	ETRI, Samsung Thales	Measurement & reporting

6. Measurement & Reporting:
Comments & Discussions

- Do we need additional measurements?
- What type of information to measure and report
  - Queue status
  - Interference (including inter-RS)
  - End-to-end throughput and latency
  - Measurement of UL signal at RS
  - Aggregated vs. link per link basis
- Reporting mechanisms and procedures
  - New MAC messages
  - New TLV
  - New (second) CQICH region
  - Existing ones
- Physical Layer modification to enable the measurement
  - Dependency on frame structure
    - RS preamble, post-amble, mid-amble
  - Sounding Symbol
  - Could be discussed with Frame structure

7. Mobility management (1)

No.	Title	Author 1	Affiliation	Category
159	Signaling for Efficient Routing	Eugene Visotsky	Motorola	Handover
166	Network Topology Advertisement for IEEE 802.16j	Chie Ming Chou,	ITRI	Handover
190	Relay Handover	Yousuf Saifullah,	Nokia	Handover
217	Overview of the proposal for MS MAC handover procedure in an MR Network	Hyunjeong Lee	Intel, Ewha Womans University	Handover
218	MS MAC Handover Procedure in an MR Network – Network Topology Acquisition and MS Scanning	Hyunjeong Lee	Intel, Ewha Womans University	Handover *presentd w/217
219	MS MAC Handover Procedure in an MR Network – Handover Decision and Initiation	Hyunjeong Lee	Intel, Ewha Womans University	Handover *presentd w/217
220	MS MAC Handover Procedure in an MR Network – Handover Execution	Hyunjeong Lee	Intel, Ewha Womans University	Handover *presentd w/217
221	MS MAC Handover Procedure in an MR Network-Termination	Hyunjeong Lee	Intel, Ewha Womans University	Handover *presentd w/217
227	Group Handover on the Mobile RS	Sungkyung Kim	ETRI	Handover
265	MS-handover support directed by MMR-BS	Hyunjeong Kang,	Samsung Electronics, Samsung AIT	Handover
267	MS handover support by RS	Hyunjeong Kang,	Samsung Electronics, Samsung AIT	Handover *presentd w/265
268	HO complete indication	Hyunjeong Kang,	Samsung Electronics, Samsung AIT	Handover *presentd w/265
269	MS scanning support by RS	Hyunjeong Kang,	Samsung Electronics, Samsung AIT	Handover *presentd w/265
270	Reduced Neighbor Information Generation and Customized Delivery	Rakesh Taori,	Samsung AIT, Samsung Electronics, Yonsei University	Handover *presentd w/265
280	MS Handover Support in Relay Mode	Gang Shen,	Alcatel, Research & Innovation	Handover
245	MS Intra-Cell FBSS	Hang Zhang,	Nortel	Handover

7. Mobility management (2)

No.	Title	Author 1	Affiliation	Category
164	An efficient relay path management scheme for IEEE 802.16j	David Comstock,	Huawei	Routing & path management
168	A RS Clustering Scheme for IEEE 802.16j	Tzu-Ming Lin,	ITRI	Routing & path management
195	Topology Discovery and Path Management in multi-hop relay System	Haihong Zheng,	Nokia	Routing & path management
196	Transmission Scheme of MAC Management Message towards a RS Group in multi-hop relay System	Haihong Zheng,	Nokia	Routing & path management
212	Data Forwarding and Routing Path Setup for 802.16j multi-hop relay networks	Haiguang Wang,	Institute for Infocomm Research	Routing & path management
222	Relay Path Management and Routing for 802.16j	Zhong Fan,	Toshiba Research Europe	Routing & path management
253	Route Update with Efficient CID Management	Aik Chindapol	Siemens	Routing & path management
293	Multi-hop Path Management	Erwu Liu,	Alcatel, Research & Innovation	Routing & path management
296	Link Adaptive Multi-hop Path Management for IEEE 802.16j	Hyukjoon Lee	Kwangwoon University, ETRI	Routing & path management

No.	Title	Author 1	Affiliation	Category
287	Neighborhood Discovery and Topology Learning	Zou Wei	Alcatel, Research & Innovation	Neighborhood discovery

7. Mobility management (3)

No.	Title	Author 1	Affiliation	Category
128	A proposal for timing compensation of idle mode in MR	Keniichi Nakatsugawa	Fujitsu	Idle mode
194	MRS Paging Group Update	Shashikant Maheshwari,	Nokia	Idle mode

No.	Title	Author 1	Affiliation	Category
131	A proposal for timing compensation of sleep mode in MR	Keniichi Nakatsugawa	Fujitsu	Sleep mode
136	Obtaining Sleep Mode Information in RS	Yuefeng Zhou	Fujitsu	Sleep mode
173	Sleep Mode and Idle Mode Operations for IEEE 802.16j	Shiao-Li Tsao,	NCTU/ITRI	Sleep mode
209	Sleep Mode with RS	Yousuf Saifullah,	Nokia	Sleep mode

No.	Title	Author 1	Affiliation	Category
129	A proposal for synchronous MBS transmission in MR	Keniichi Nakatsugawa	Fujitsu	MBS

7. Mobility management: Comments & Discussions - Handover

- Can we use the existing handover Messages (MOB-*) and procedure?
  - Neighborhood advertisement
    - How to broadcast for RS/MS?
  - Scanning
  - Procedures
  - How to split the functions between BS/RS
    - Centralized or distributed
  - How to handle multiple new handover scenarios?
- New handover procedure for MRS?
  - Modification based on existing one
- Handover in MRS
  - Where to perform connection management (BS or MRS)
- Handover for different RS types: transparent, non-transparent
  - Need to decide frame structure first
- FBSS for intra-BS handover between RSs
- Handover level
  - Handover between RS/cluster/Group RSs ?
- Security and QoS

Mobility Management
Routing and Path management

- Identification
  - CID based
- Topology and Path management and identification
  - Topology discovery (related to neighborhood discovery)
  - Path discovery (related to routing)
    - Some dependency on physical layer structure
    - Pure MAC messages
  - Routing and metrics
    - Shortest distance
    - Highest throughput/BW
    - Lowest power
    - Shortest delay
  - Creation
    - Network initial entry
  - Updating
  - Cancellation
  - Linkage with measurements
- Multiple relay paths or pure tree structure?
- What needs to be standardized?
  - Provide measurement reports
  - Signaling
  - Shall we specify the actual schemes such as routing metrics?

Mobility Measurement
Idle/sleeping/paging/MBS

- What is needed to be changed for centralized scheduling?
  - Timing compensation for processing delay
- What is needed to be changed for distributed scheduling?
  - How to handle data traffic at RS if target MS is in sleep mode?
    - Buffering
  - How to support paging at RS?
- Sleep mode at RS?
- Idle mode support at MRS?

8. RRM, Scheduling & Interference control

No.	Title	Author 1	Affiliation	Category
149	Resource reuse and interference management mechanism	Wei-Peng Chen	Fujitsu	RRM & Interference control
169	Reusing the Radio Resources in IEEE 802.16j Multi-hop Relay System	I-Kang Fu,	ITRI	RRM & Interference control
223	Fractional Frequency Reuse for IEEE802.16j Relaying Mode	Khurram Rizvi,	Toshiba Research Europe	RRM & Interference control
291	Effective Node Assignment in 2-Hop Fixed Relay Networks	Vahid Pourahmadi	University of Waterloo, Nortel	RRM & Interference control

No.	Title	Author 1	Affiliation	Category
192	Relay Support for QoS	Haihong Zheng,	Nokia	Scheduling

8. RRM, Scheduling & Interference control:
Comments & Discussions

- Provide a mechanism for interference measurement and reporting
- Fractional reuse?
  - Could leave it to the deployment
- Resource assignment based on interference measurement results
- QoS support
  - No change for centralized scheduling
  - New Service flow management procedure for RS for distributed scheduling

9. PHY (1)

No.	Title	Author 1	Affiliation	Category
126	DL HARQ method for user-transparent relaying	Junichi Suga	Fujitsu	HARQ
197	HARQ with Relays	Haihong Zheng,	Nokia	HARQ
266	Relay-Assisted HARQ	Aik Chindapol	Siemens	HARQ
292	HARQ Mechanisms in Multi-hop Relay	Wei Ni,	Alcatel, Research & Innovation	HARQ
140	Power control in MR networks	Mike Hart	Fujitsu	Power control
216	Relay-Station Power Control and Channel Reuse	Peter Wang,	Nokia	Power control
244	Access-Uplink closed loop power control by MMR-BS or RS in MMR system	Yong Su Lee	ETRI, Samsung Thales	Power control

9. PHY (2)

No.	Title	Author 1	Affiliation	Category
183	Rate Compatibility and Incremental Redundancy HARQ for 802.16j LDPC	Wataru Matsumoto	Mitsubishi	Modulation & coding
251	Demodulation and Forwarding Method in Relay Station	Su Chang Chae	ETRI, SAMSUNG THALES	Modulation & coding
203	AAS Direct Signaling Methodologies to Support High Capacity MMR-BS to RS Links	Dale Branlund	BRN Phoenix, DIRECTV Group	AAS
264	Cooperative Relaying Scheme for IEEE 802.16	Jimmy Chui,	Siemens	MIMO
273	Cooperative diversity in relay downlink	Kyu Ha Lee	Samsung Thales, ETRI	MIMO *presented w/264

9. PHY: Comments & Discussions

- HARQ support for transparent relay
  - How to relay ACK/NAC
  - Need to consider processing delay/latency
  - Sub-packet relaying method
- HARQ for centralized and distributed scheduling
  - Per link (hop)?
  - Multi-link?
  - End-by-end?
- Discuss with ARQ
- Power control
  - Could reuse the existing UL power control mechanism for RS with some clarifications, possible to introduce a basic mechanism to set maximum DLTx power for RS
  - Message to change the locations of power control (i.e., at RS or BS)? Is this necessary? Should this depend on the type of scheduling mechanism?

PHY

- New 1/3 code rate RC-LDPC code and IR-HARQ
- Support demodulation and forwarding without channel coding for simple relay
- AAS supports for BS-RS link using direct signaling methodologies
- Cooperative diversity
  - Using the existing MIMO codes for virtual MIMO transmission

Note: Do we consider backward compatibility if we use the reserve bits from the exiting IEs?

10. Others

No.	Title	Author	Affiliation	Topic
162	Correction to Path Loss Model in C80216j-06/13r1	David T Chen	Motorola	Evaluation Methodology withdrawn by the author
252	Correction to Path Loss Models in C80216j-06/13r1	Mark Naden,	Nortel	Evaluation Methodology Accepted with no objection for correction
262	Amendments to the Multi-hop Relay System Evaluation Methodology Document	Gamini Senarath,	Nortel	Evaluation Methodology Deferred by the author
271	URBAN ART-ART Path Loss Model	Mark Naden,	Nortel	Evaluation Methodology Info only (covered by 262)
290	Definitions, abbreviations and acronyms for P802.16j baseline document.	Mike Hart	Fujitsu	Definitions, Abbreviations, Acryonms Deferred by the author
229	Relay Combining Hybrid ARQ for 802.16j	Mingshu Wang	DoCoMo Beijing Lab	Initially rejected as non-compliant Dealt as Delayed Contribution
294	Cooperative RS Transmission Scheme on IEEE802.16j	Mingshu Wang	DoCoMo Beijing Lab	Initially rejected as non-compliant Dealt as Delayed Contribution
230	Efficient Resource Utilization Scheme on the basis of Precoding and Cooperative Transmission in Downlink	Mingshu Wang	DoCoMo Beijing Lab	Initially rejected as non-compliant Dealt as Delayed Contribution
	*229, 294, 230: It is confirmed that Comments summarized at each category can cover those.			

Not Covered

No.	Type	Title	Author	Reason
185	Commentary		Koon Hoo	Incorrect format for contribution. Incorrect document under review. Content is out-of-scope of the PAR
186	Commentary		Toshiyuki Kuze	Incorrect format for contribution. Incorrect document under review.
187	Commentary		Jeffrey Tao	Incorrect format for contribution. Incorrect document under review.
191	Contribution		Yousuf Saifullah,	Duplicate of 209

How to Proceed -1

- Topic by topic approach
- Relay concepts (5 mins/contribution)
- Others very brief summary of key points (ideally 2 mins./contribution)
- Discussion at end of topic
- Plan
  - Mon: Opening & discuss plan & categories (incl. not covered)
    - Check categories correct
  - Tue (day): Deal with all topics upto and including BW request
  - Tue (eve): Harmonisation & discussions in the meeting room (may not be official meeting)
  - Wed (day): Deal with remaining topics
- Some of the contribution categorization/ presentation order modified from the initial plan as listed here.

How to Proceed -2

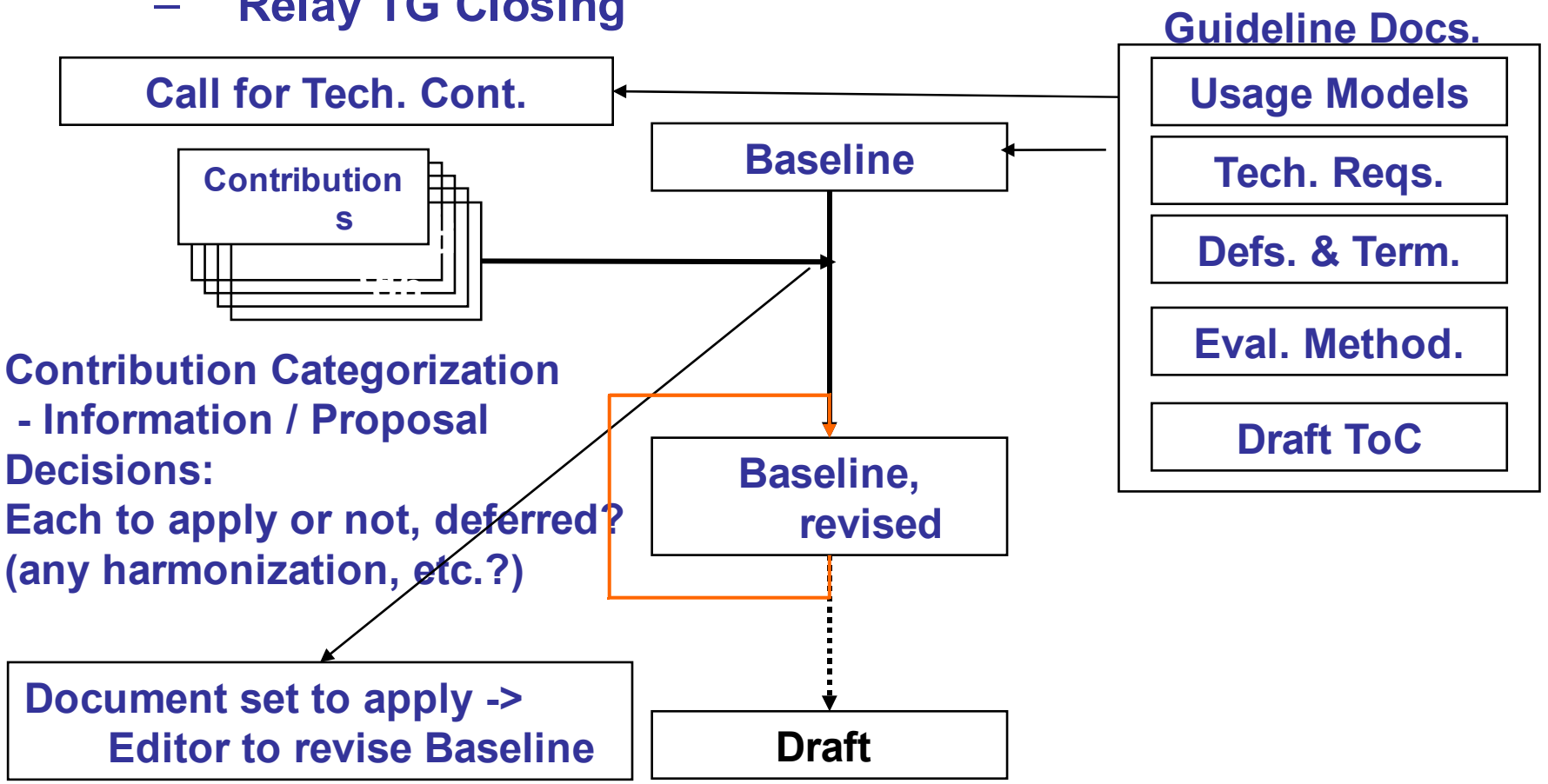
- Topic by topic based Discussion/Decisions
  - Thu: Topic by topic based discussion/decisions

Thursday AM:

- Topic by Topic wrap-up

Thursday PM*

- Relay TG Closing



Harmonization Efforts (merger)

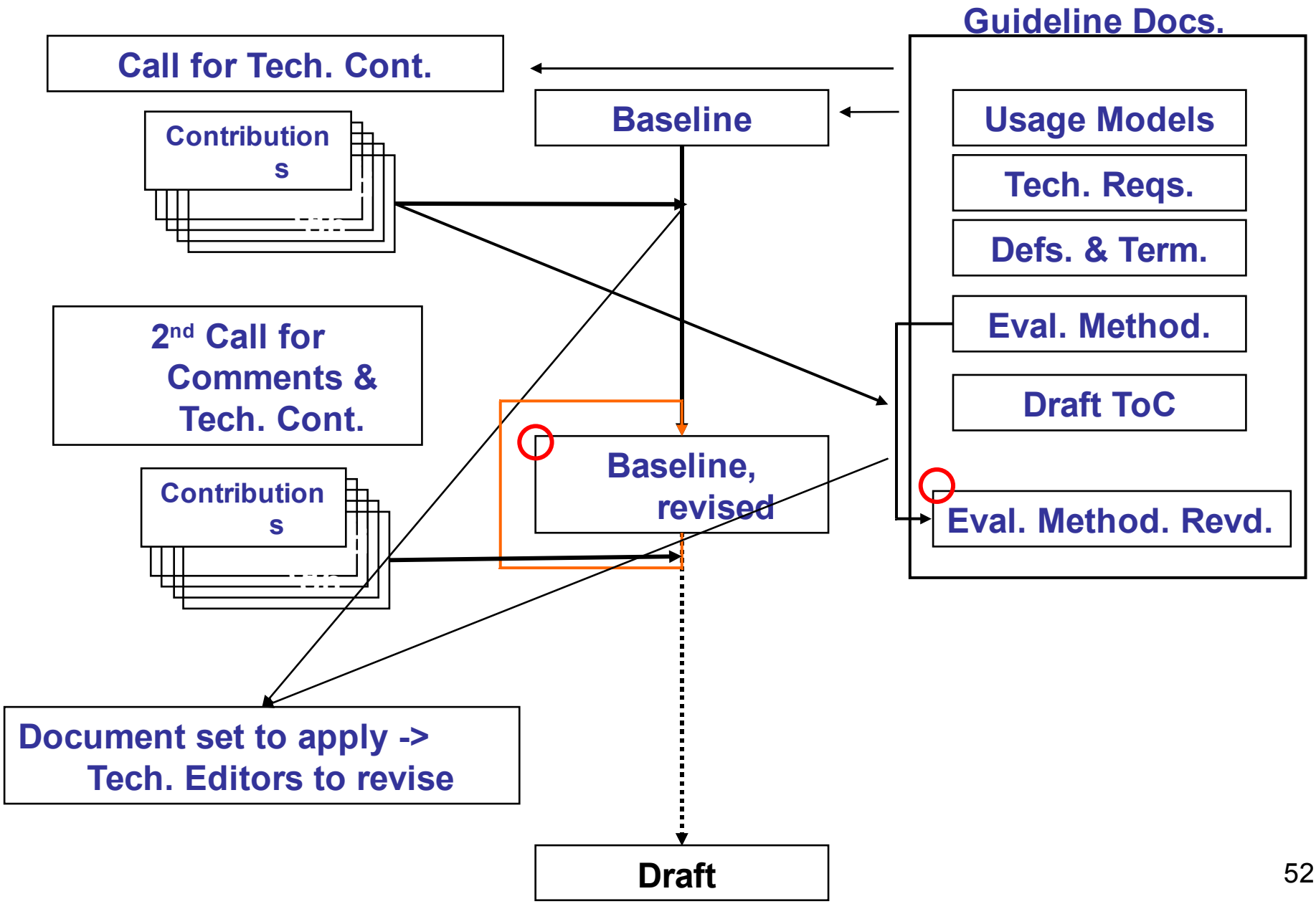
*Some other efforts also taken

125	-> 189r1
138 & 256	-> 233r2
148, 149 & 168	-> 169r1
170	-> 274r1
172 & 211	-> 124r3
172 & 193	-> 133r2
247	-> 207r2
247	-> 208r2
250	-> 127r1

Contributions taken to Guideline/Baseline Docs.

No.	Title	Author	Affiliation	Topic
252	Correction to Path Loss Models in C80216j-06/13r1	Mark Naden,	Nortel	Evaluation Methodology Accepted with no objection for correction
262	Amendments to the Multi-hop Relay System Evaluation Methodology Document	Gamini Senarath,	Nortel	Evaluation Methodology
233	Frame Structure to Support Relay Node Operations	Peiying Zhu	Nortel	Frame structure
169	Reusing the Radio Resources in IEEE 802.16j Multi-hop Relay System	I-Kang Fu,	ITRI	RRM & Interference control

How to Proceed -2 (revd.)



Summary

3. 156 contributions submitted, presented and covered: Thank you!
4. 2 contributions on Eval. Method. (252, 262) were accepted by the TG. *Tech. Editors to modify 802.16j-06/013r1 and make 802.16j-06/013r2.
5. 11 contributions submitted as Harmonization results (revised/new.)
6. Contributions reviewed whether to be applied to the baseline document:
   to be included: 233r8, 169r2.
   *Tech. Editors to modify it.

- Way forward
- TG Chair to issue Call for Technical Contributions
- Chair Team to arrange some ad-hoc discussions towards the next session (on dot16 web-site.)

Motions at Relay TG Closing

3. To authorize the Technical Editors to revise the guideline document: Evaluation Methodology (802.16j-06/013r1) to accommodate the comments accepted: (C252 & C262.)

   6:30pm 1st: Peiying Zhu 2nd: Roger Peterson,

   motion passed with no objections

- To authorize the Technical Editors to revise the baseline document (802.16j-06/026) to accommodate the comments accepted (C233r8 & C169r2.)

  6:31pm 1st: I-Kang Fu, 2nd: Jaeweon Cho,

  motion passed with no objections

- To authorize the TG Chair to issue a "Call for Technical Contributions."

  6:33pm 1st: Panyuh Joo, 2nd: Sunil Vadgama,

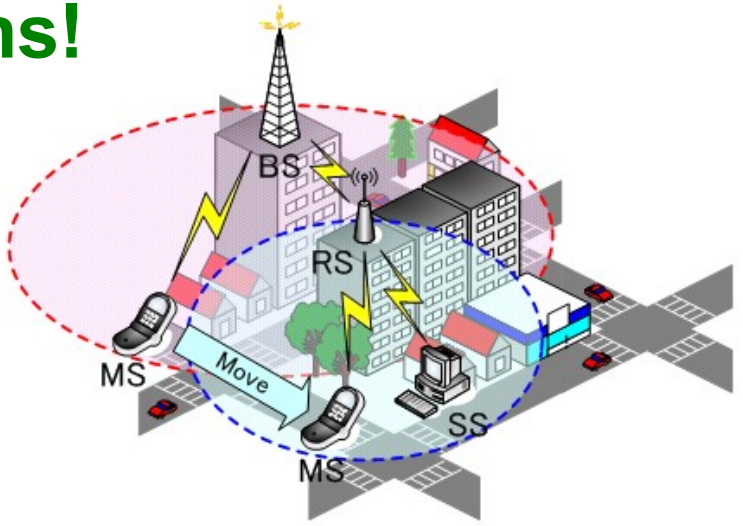
  motion passed with no objections

Relay-TG Meeting Calendar This Week

16:00 – 18:00, Mon. 13 Nov.
08:00 – 22:00, Tue. 14 Nov.
08:00 – 18:00, Wed. 15 – Thu. 16 Nov.

Room: Landmark C, Hyatt Regency Dallas
Dallas, Texas, USA

Thank you for your participation and Contributions!



*Reference: C802.16-005/013