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Re:	The document provides analysis for resolution of comment #765 at Session #33	
Abstract	The document provides analysis for resolution of comment #765 at Session #33	
Purpose	The document should be considered during resolution of Sponsor Ballot comments on IEEE 802.16e/D5	
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SHO and FBSS resolution

Vladimir Yanover (Alvarion Ltd.)

1. Background

The following is the content of comment #765 on IEEE 802.16e/D5

There are many ambiguous and inconsistent elements in specification of SHO and FBSS.
The following is a list of issues

1. There is a need in detailed specification of PHY scenarios for SHO/FBS [similar to "SHO Based Macro-Diversity Transmission Scenarios" in IEEE C802.16e-04/170r1]. For MAC operations there is a big difference between RF level combining, soft combining and selection diversity.

2. The assumption of SHO is that state machines of MAC [of specific connections] at all BSs from Active Set are tightly synchronized. At SHO two BSs must transmit SAME PHY BURST at DL that means concatenation of same MAC PDUs with same payloads, headers/subheaders, CIDs, BSNs. Can it be practically implemented other way than having a single MAC processor in which the whole burst payload is being built and then distributed to several BS transceivers? Obviously not all BSs will be implemented this way. It means that ability to participate in Active Set must be a not individual capability of BS but GROUP capability [group consists of BSs having "common MAC processor"]. So the standard needs a language to describe capability of this type. There must be a definition of process MSS follows to learn such group capability. Possible implementation: a "L1 combining group ID" might be assigned to relevant BSs so that if for two BSs "group IDs" are equal, they have "common MAC processor" and therefore may be a part of same Active Set.

3. All other topics of standard consider one MSS - one BS relationship. SHO/FBSS topic is the only one that considers one MSS - many BSs relationship. So there is a need in definition of "anchor BS -MSS", "non-anchor BS - MSS" etc. relationship. Operations [like "Anchor BS update"] must be described in these terms. See also #4.

4. It is not clear from the text at which BS the MSS is registered while in SHO/FBSS state. According to the rest of definitions in 802.16-2004/802.16e, MSS is either registered at certain BS [then having specific connections associated with specific Service Flows, security context etc.] or it is not [and then there is no network data transfer between the MSS and the BS]. If the answer is that MSS in SHO/FBSS state is not registered to any BS then there are no authentication relationship and no MAC connections between BSs and MSS and therefore most of MAC definitions is not applicable.

5. There is a need in certain set of conditions (assumptions) for SHO/FBSS procedures to be applicable (like frame clock synch - see examples in original contribution #171r1).

6. Definitions of terms SHO and FBSS are absent (see contribution #171r1).
Why described "SHO" ["FBSS"] procedure is referred to as "handover"? MSS may stay registered at certain BS just using diversity combining of any sort. Seems more logical to redefine "SHO state" as e.g. "L1 combining with respect to Active Set X " [FBSS as "L2 combining"], both not necessarily related to any HO. Then handover of certain type will include a phase when the MSS is in "SHO" state.

7. Combining SHO and FBSS specs in same sections makes text too complicated

Above problems make impossible to understand the procedures related to SHO/FBSS. For example, how MSS transitions from state "registered at a single BS" to state "communicates simultaneously to several BSs" . So the whole concept of soft combining needs reconsideration

The following is the resolution of the comment:

The definitions were provided under comment 701.

[add the following text to the end of section 6.3.20.2.6]
There are several conditions that are required to enable soft handover and or Fast BS Switching handover between MSS and a group of BSs. These conditions are listed below:
· The BSs involving in SHO/FBSS HO are synchronized based on a common time source;
· The frames sent by the BSs involving in SHO/FBSS HO at a given frame time arrive at the MSS within the prefix interval
· BSs involving in SHO/FBSS HO have synchronized frame structure
· BSs involving in SHO/FBSS HO have level 3 context transfer or sharing
· BSs involving in SHO/FBSS HO have the same frequency assignment
· BSs involving in SHO shall use the same set of CIDs for the connections that are established with the MSS.
SHO further requires the following conditions:
· The same MAC/PHY PDUs shall be multicast by the BSs involving in SHO to the MSS

2. Conclusion

As clear from the provided background, of 7 (seven) problems mentioned in the comment only one (#5) is addressed in the resolution. It is disputable whether resolution of item #5 is satisfactory, but no doubt that another six problems were not addressed at all.