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| Re: | A response to a Call for Technical Proposals regarding IEEE 802.16j. |
| Abstract | The document describes provides a handover method for the Mobile RS. |
| Purpose | The document is submitted for review by 802.16 Working Group members. |
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# Handover of Mobile Relay Station

## Introduction

In a MMR network, a mobile RS is generally mounted on the vehicle and connected with an MR-BS or other RS via a wireless relay link. MRS provides a fixed wireless access link to MS/SS devices on the vehicle. Moreover, it shall have the capability of handover between neighboring access stations. If a MRS is moving between different RSs or BSs, both MRS and its subordinate MS may involve into a handover process. To ensure the quality of service and compatibility with existing standard, the existing HO procedures of MS must be remains.

Depending on the location where the access station and target access station are located, there are two sorts of HO, intra-BS HO and inter-BS HO. Intra-BS HO happens when the current access station and targeting access station belongs to the identical MR-BS. If the access station and the target access station are located in two neighboring distinct BSs respectively, inter-BS HO would be triggered. The access station and target access station of MRS could be MR-BS or RS.

This contribution proposes a handover approach and mechanism for Mobile Relay Stations. It not only fully complies with existing handover process defined in IEEE802.16e, but also maintains the service continuity of the MS affiliated to the MRS.

## Proposed Solution

In the in-band relay scheme, when Mobile RS is moving across two neighboring access stations, both MRS and its affiliated MS shall experience a handover process. As illustrated in Figure 1, In order to maintain the service continuity of MS, it is proposed to divide the handover process into several steps:

- **MS intermediate HO.** Before MRS tries to scan potential target MR-BS or RS, the affiliated MS handover from its access MRS to the target access station, which could be the serving MR-BS or other neighboring RS with better signal quality. This handover could be triggered by decreasing the MRS power level or initiated by the serving MR-BS. If the MRS and the target access station have different preambles, the MS would follow the handover process as defined in section 6.3.22.2. If the preambles are same (e.g. intra-HO in transparent frame structure), the serving MR-BS shall conduct the handover process by updating the MAP and radio resource scheduling;
- **MRS HO.** Following the completion of MS intra-BS HO from MRS to the interim target access station (serving MR-BS or other RS), MRS shall performs cell selection by scanning neighboring target stations. If the HO decision is successfully initiated, MRS would follow the other procedures defined in 6.3.22.2 to complete the HO from the access station to target access station. If the HO trigger condition is not satisfied or it is failed to make the HO decision, the HO process will be canceled and the MRS shall re-connect with the access station. During MRS HO process, MS keeps communication with the interim target access station rather than the MRS;
- **MS HO to MRS.** After MRS completes the handover process, the quality of the radio link between the on board MS and the MRS would be better than others. Therefore, MS performs the handover from current serving station to MRS. If the MRS and the serving station have different preambles, the MS would follow the handover process as defined in section 6.3.22.2. If the preambles are same (e.g. intra-HO in transparent frame structure), the serving MR-BS shall conduct the handover process by updating the MAP and radio resource scheduling. The MS is not aware of this handover process.

The Mobile RS (MRS) handover process deals with handover of the MRS along with all the affiliated MSs to a target access station. During the handover process, the MRS performs the procedures with the access station and the target access station in the similar way as an MS does.

The proposed solution can be used in the non-transparent frame structure as well as the transparent frame structure. And both Mobile RS MRS and its affiliated MS shall basically follow the similar handover process as described in section 6.3.22.2.

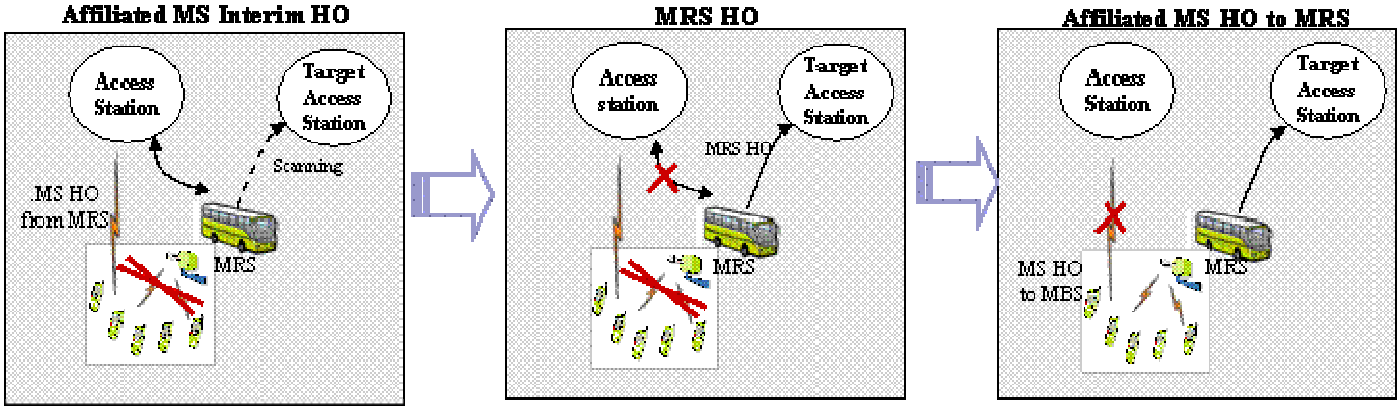


Figure 1 MRS handover process

## Conclusion

This proposal provides a solution for the handover of MRS with its affiliated MS. It can support the transparent frame structure as well as the non-transparent frame structure, and requires less modification on the existing handover procedures defined in IEEE Std. 802.16e. The service continuity of the MRS's affiliated MS can be maintained.

## Proposed text changes

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*[Make the indicated modifications to section 6.3.22:]*

6.3.22 MAC layer handover procedures

This subclause contains the procedures performed during handover (HO).

An MS shall be capable of performing handover using the procedures defined in 6.3.22.2.

An Mobile RS shall be capable of performing handover using the procedures defined in 6.3.22.2.

The handover process defined in this subclause may be used in a number of situations. Some examples are as follows:

— When the MS or the MRS moves and (due to signal fading, interference levels, etc.) needs to change the BS to which it is connected in order to provide a higher signal quality;

— When the MS or the MRS can be serviced with higher QoS at another BS;

The handover decision algorithm is beyond the scope of the standard.

*[Insert the new subcluase 6.3.22.4]*

6.3.22.4 Mobile RS HO

The subclause defines the MRS HO process in which an MRS with its affiliated MS migrates from the air-interface provided by one serving station to the air-interface provided by another serving station. The HO process consists of the following stages:

— Intermediate HO of the affiliated MS. All MSs associated with the MRS performs handover from the MRS to another access station that provide the access to the affiliated MS when MRS performs neighboring scanning and other handover procedures;

— MRS HO. MRS performs scanning and other handover procedures that are similar to the MS handover procedures defined in 6.3.22.2, and synchronize to the target station as the HO decision indicates;

— Affiliated MS handover back to MRS. The MS originally affiliated to the MRS performs the procedures defined in 6.3.22.2 to handover to the MRS from other stations. The handover can be trigger by either MOB_MSHO-REQ or MOB_BSHO-REQ.

++++++++++++++++++++ *End of text proposal* ++++++++++++++++++++++