

Introducing the concept of mobile ad hoc network to 802.16j

IEEE 802.16 Presentation Submission Template (Rev. 8.3)

Document Number:

IEEE C802.16j-06/048

Date Submitted:

2006.7.3

Source:

Yukihiro Takatani e-mail: takatani@sdl.hitachi.co.jp
Systems Development Laboratory, Hitachi, Ltd.
1099, Ohzenji, Asao-ku, Kawasaki-shi, Kanagawa 215-0013, JAPAN

Seishi Hanaoka e-mail: seishi.hanaoka.kw@hitachi.com
Central Research Laboratory, Hitachi, Ltd.
1-280, Higashi-Koigakubo, Kokubunji-shi, Tokyo 185-8601, JAPAN

Venue:

IEEE 802.16 Session #44 (IEEE 802 Plenary Session), San Diego, USA

Base Document:

None

Purpose:

The objective is considering technical requirements for the method of link topology establishment in 802.16j.

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 grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.

IEEE 802.16 Patent Policy:

The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <<http://ieee802.org/16/ipr/patents/policy.html>>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <<mailto:chair@wirelessman.org>> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <<http://ieee802.org/16/ipr/patents/notices>>.

Introducing the concept of mobile ad hoc network to 802.16j

- Consideration of technical requirements -

Yukihiro Takatani and Seishi Hanaoka
Hitachi, Ltd.

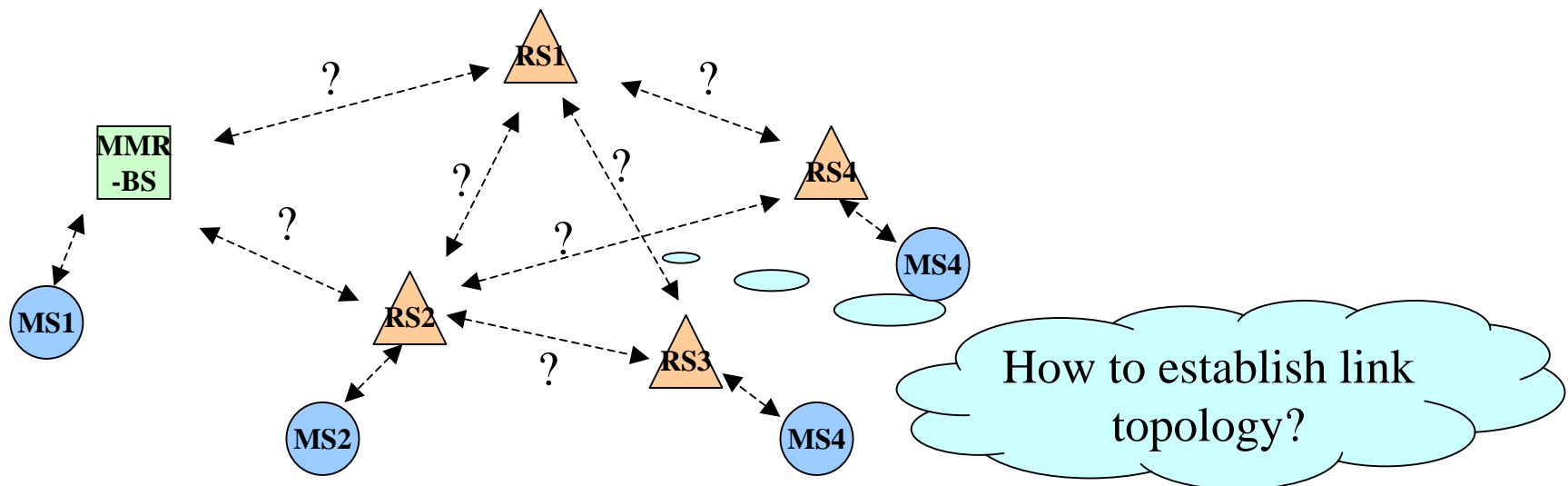
Part of this project is funded by Ministry of Internal Affairs and Communications of the Japanese Government.

Contents

- Background and Motivation
- Overview of mobile ad hoc network (MANET)
- Introducing the concept of MANET to 802.16j
- Requirements for 802.16j
- Summary

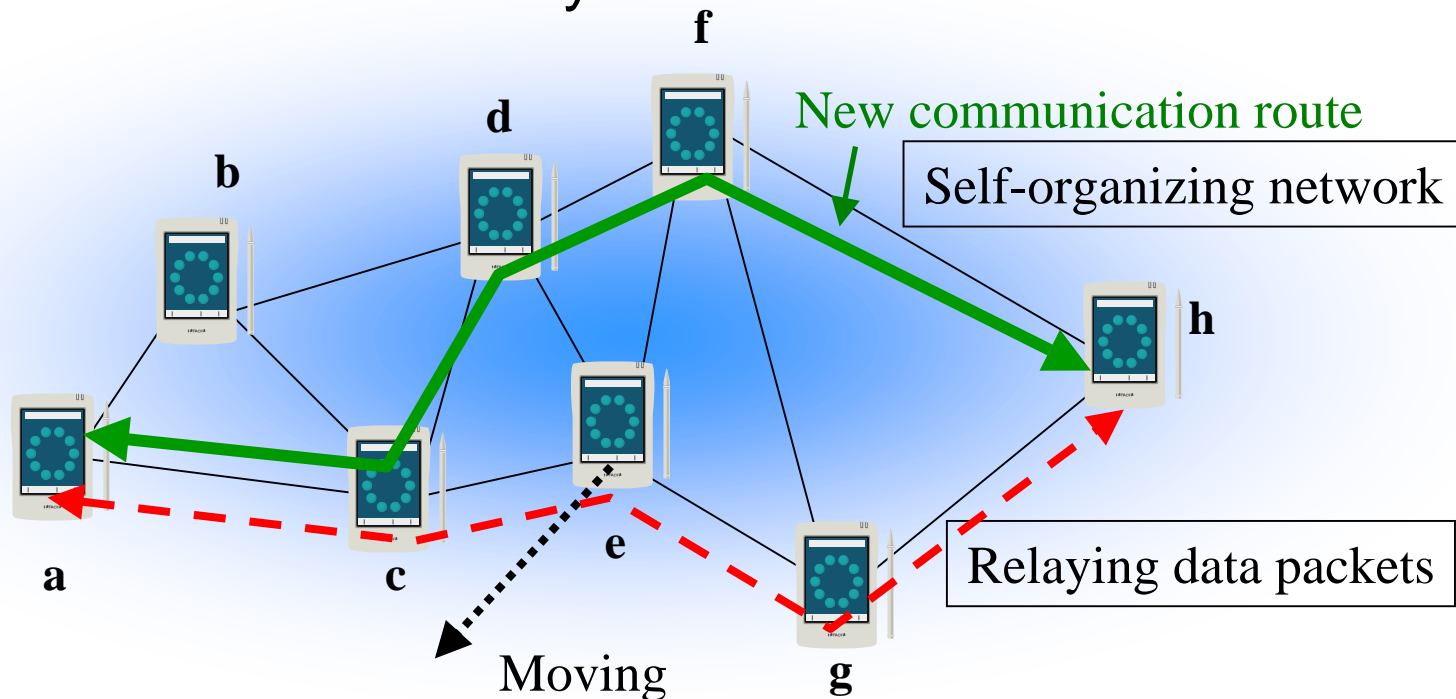
Background and Motivation

- 802.16j realizes data communication with relay functionality of RS between MMR-BS and MS.
- If there are several RSs around MMR-BS, the method how to establish layer-2 link topology between MMR-BS and RSs (especially more than 2 hops) should be needed.
- Optimized link topology establishment will leads an efficient utilization of network bandwidth.
- The objective is considering the method of link topology establishment in 802.16j



Overview of mobile ad hoc network (MANET)

- A wireless network where mobile nodes connect each other directly (peer-to-peer).
- Self-organizing network (network topology changes according to the movement of mobile nodes).
- Mobile nodes relay data packets.
- MANET is realized mainly based on IEEE 802.11 wireless LAN.

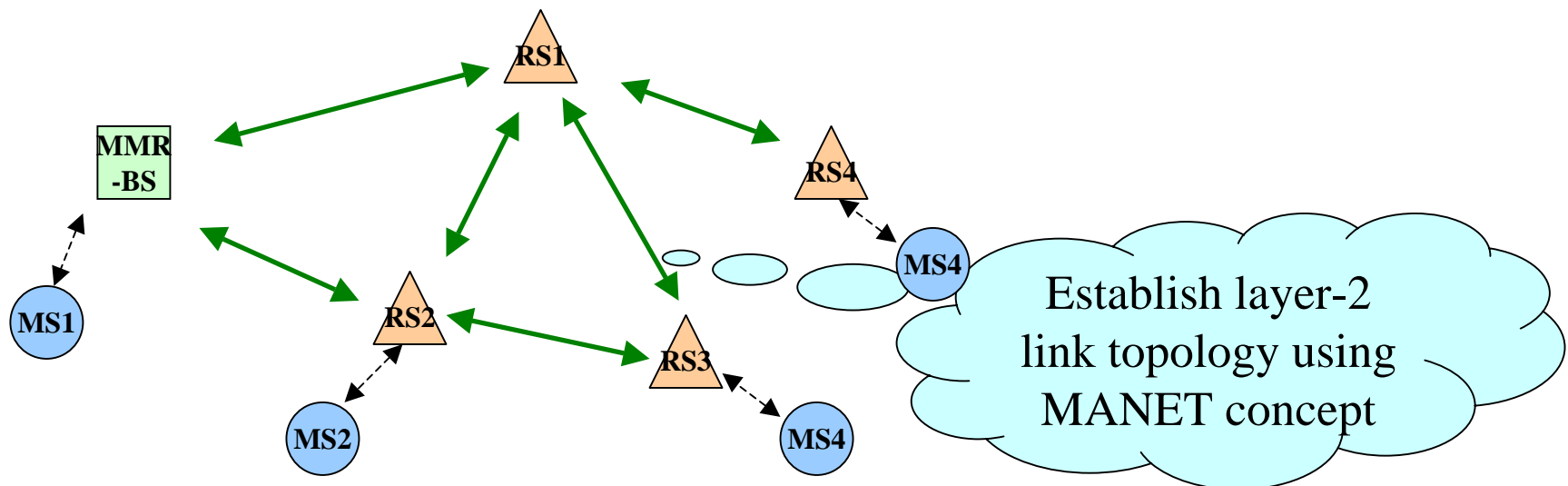


Overview of mobile ad hoc network (MANET) (cont.)

- Standardization of routing protocols for MANET is discussed on IETF MANET WG.
- Two categories of MANET protocols;
 - Proactive type : Each node updates a routing table periodically.
 - RFC 3626: OLSR (Optimized Link State Routing)
 - RFC 3684: TBRPF (Topology Dissemination Based on Reverse-Path Forwarding)
 - Reactive type : Each node creates a routing table when it starts communication.
 - RFC 3561: AODV (Ad Hoc On Demand Distance Vector Routing)
 - Internet draft: DSR (Dynamic Source Routing)

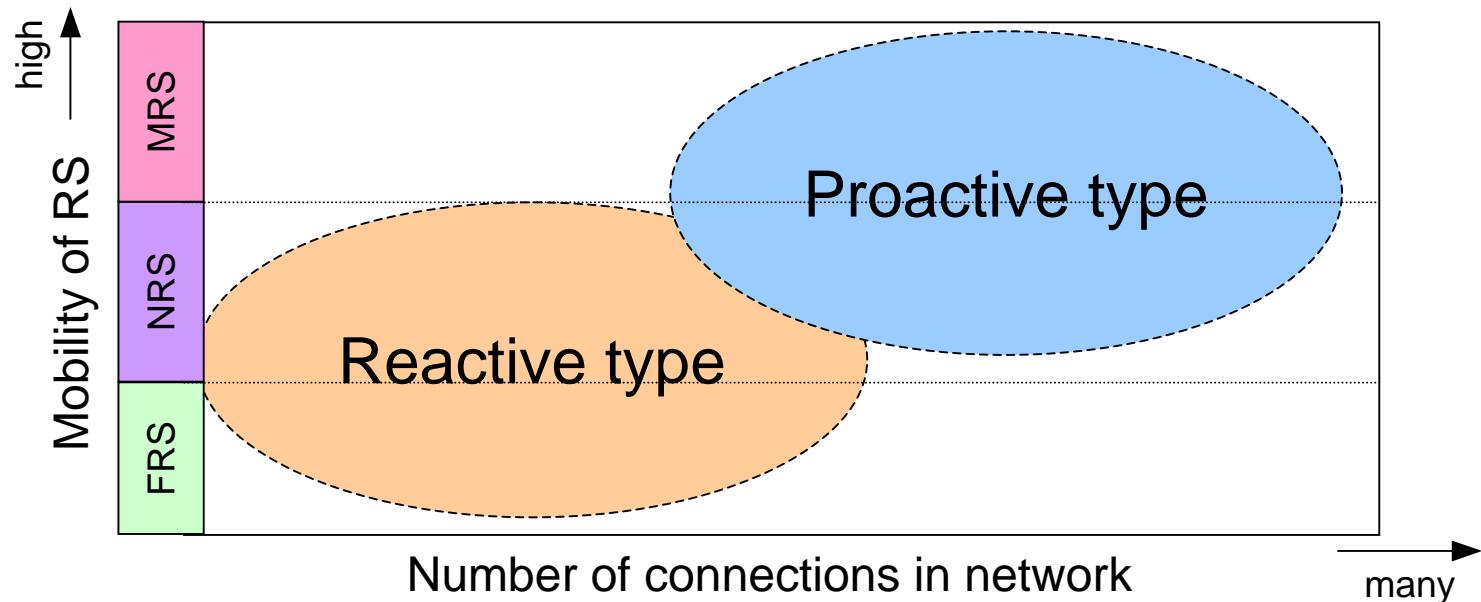
Introducing the concept of MANET to 802.16j

- MANET... Every mobile node establishes a wireless network autonomously.
- 802.16j... MMR-BS and RS establish a wireless link and MS connects to MMR-BS (via RSs).
- The MANET concept can be adapted to establish layer-2 link topology between MMR-BS and RS in 802.16j.
- Various advantages (improving system throughput, saving network resources, etc.) can be expected.



Introducing the concept of MANET to 802.16j (cont.)

- Fixed or low mobility of RS (FRS and NRS), few-moderate number of connections... Reactive type topology establishment may be suitable.
- Low-high mobility of RS (NRS and MRS), moderate-many number of connections... Proactive type topology establishment may be suitable.

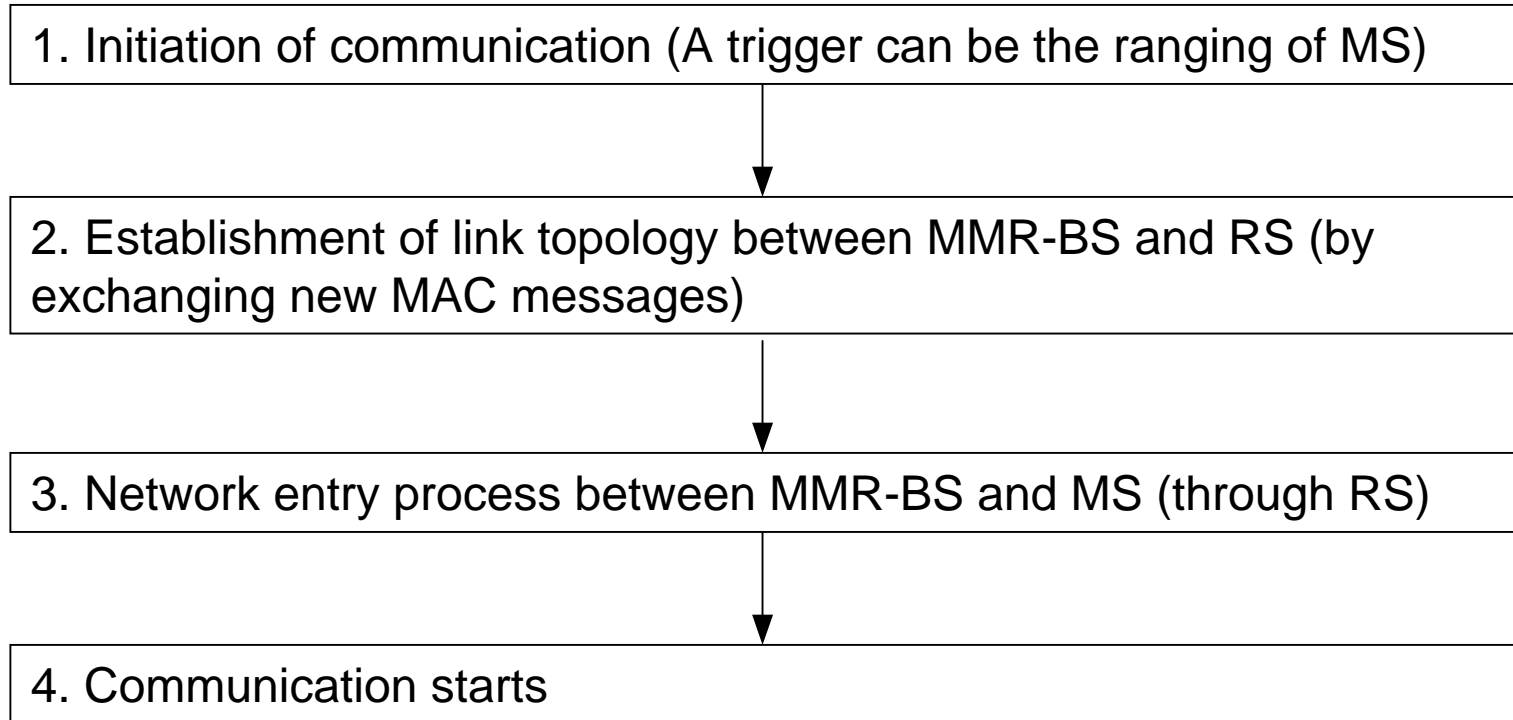


Requirements for 802.16j

- A new MAC management message to deliver link topology information should be needed.
 - link information of neighborhood (MMR-BS, RS)
 - other information depending on the selected protocol
- MMR-BS and RS exchange link topology information by a new MAC messages and establish link topology.

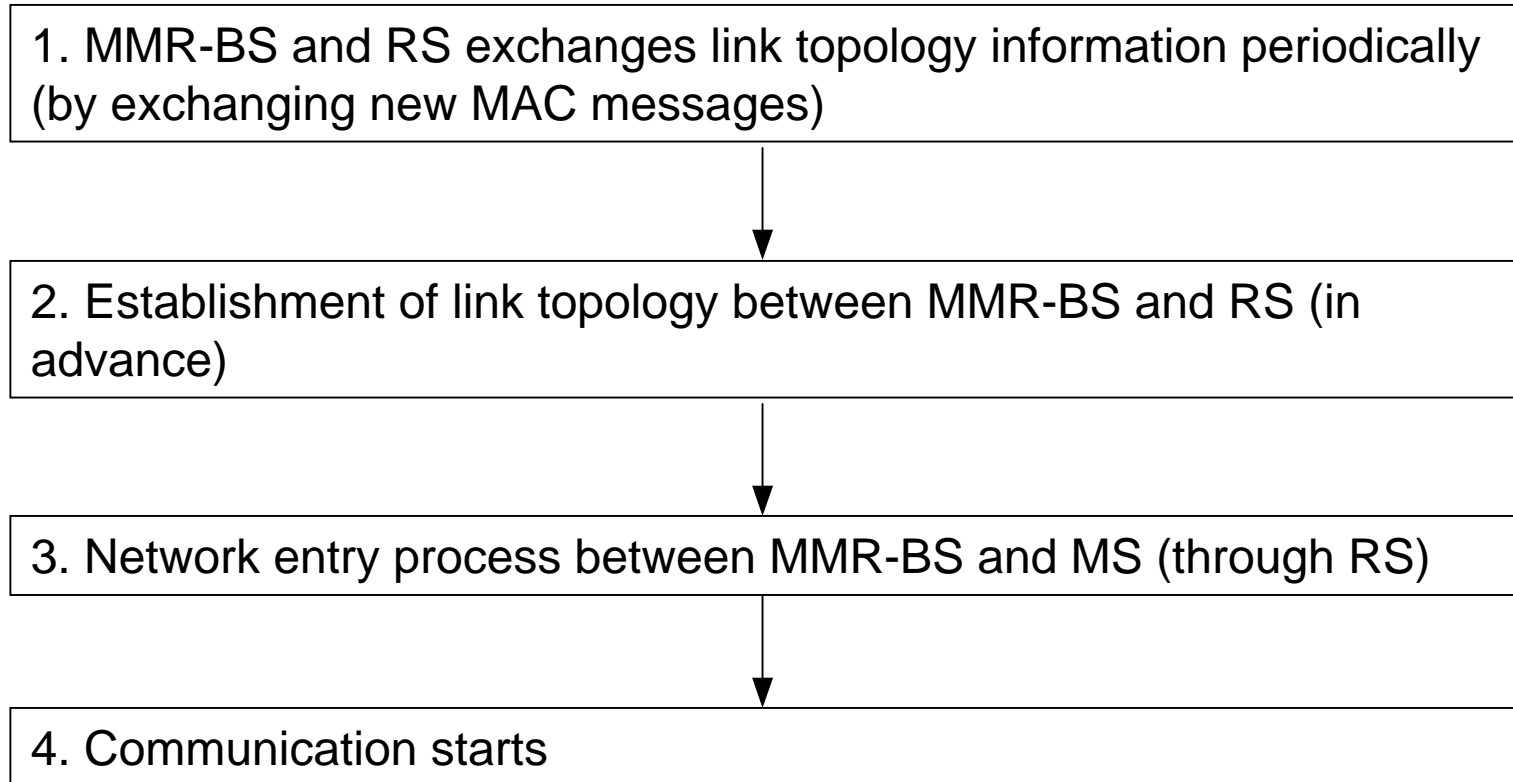
Requirements for 802.16j (cont. 1)

Flow of initialization of communication by reactive type link topology establishment



Requirements for 802.16j (cont. 2)

Flow of initialization of communication by proactive type link topology establishment



Summary

- Considering the method of link topology establishment in 802.16j.
- The MANET concept can be adapted to establish layer-2 link topology between MMR-BS and RS.
- A new MAC management message to deliver link topology information should be needed.