Abbreviated SMART Relay Alliance Proposal Presentation

Document Number: IEEE C802.16j-201r3
Date Submitted: 2006-11-14
Source:

Arnaud Tonnerre, Adrien Duprez
arnaud.tonnerre@fr.thalesgroup.com
THALES COMMUNICATIONS
Colombes, France

Djamal-Eddine Meddour
djamal.meddour@orange-ft.com
FRANCE TELECOM
Lannion, France

Peng Yong Kong
kongpy@i2r.a-star.edu.sg
I2R
Singapore

D. J. Shyy
djshyy@mitre.org
MITRE
McLean, VA, USA

Saravanan Govindan, Pek Yew Tan
Saravanan.Govindan@sg.panasonic.com
PANASONIC
Singapore

Seth Spoenlein, Ranga Reddy
Seth.Spoenhein@us.army.mil
US ARMY - CERDEC
Ft. Monmouth, NJ, USA

Byoung-Jo "J" Kim
macsbug@research.att.com
AT&T
Middletown, NJ, USA

Matthew Sherman, Keith Conner
matthew.sherman@baesystems.com
BAE Systems - NES
Wayne, NJ, USA

Venue: IEEE 802.16 Session #46 Dallas, United States
Base Document: None
Purpose: To reply to the call for proposal

SMARTRelay

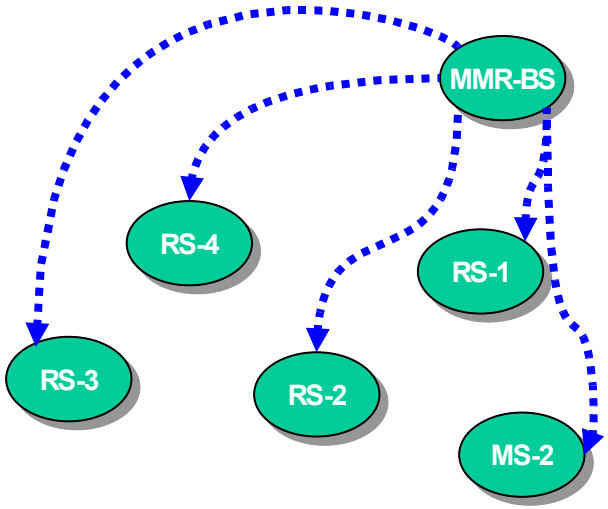
Objectives

- SMART Relay Alliance proposes RS specifications for 802.16j
- This group should take into account both
  - **Low-complexity Relay** stations for low cost solutions
  - **SMART Relay** stations for enhanced applications
- SMART Relay Alliance proposal is about this latter category

SMARTRelay

Topology management (Summary)

- **Tree topology construction at the BS**
  - Which algorithm?
    - Selection of the shortest path to the BS based on link states
  - Which metrics to weight vertices (dynamic/static)
    - At least Link states
  - Tree topology is transmitted to all nodes using CSCF messages



Tree topology transmission

- **All nodes perform these three steps periodically to handle network dynamicity**

SMARTRelay

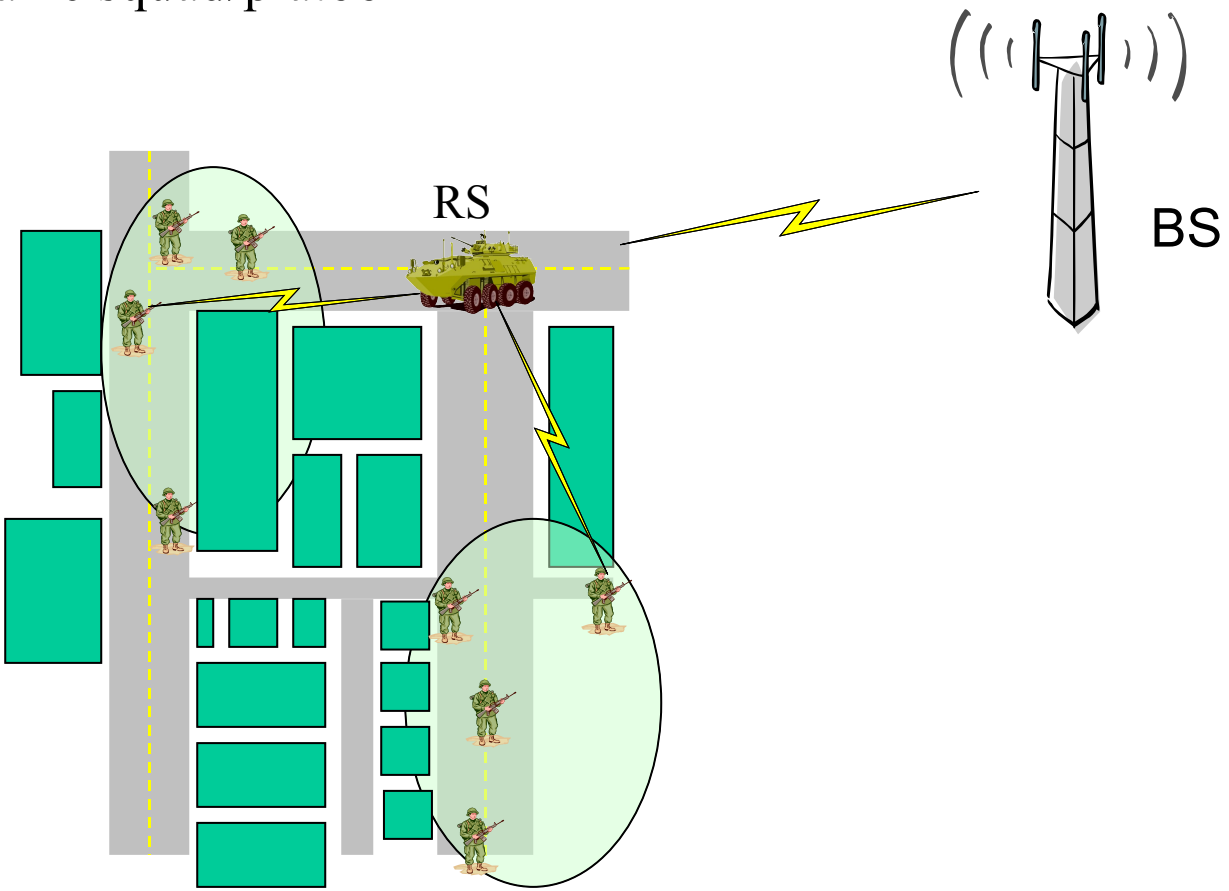
Routing (Summary)

- Use Hybrid protocol to take advantage of both Proactive and Reactive protocol
  - Proactive protocol to build a routing local table in all nodes
  - To set up dynamically new topology/routes based on the reactive one
- By default end-to-end delay is minimized (Proactive protocol)
- If other QoS Metrics are to consider, Reactive procedure is used
- The recommendation is to use Technique 3.

SMARTRelay

Cross Communications scenarios (1/4)

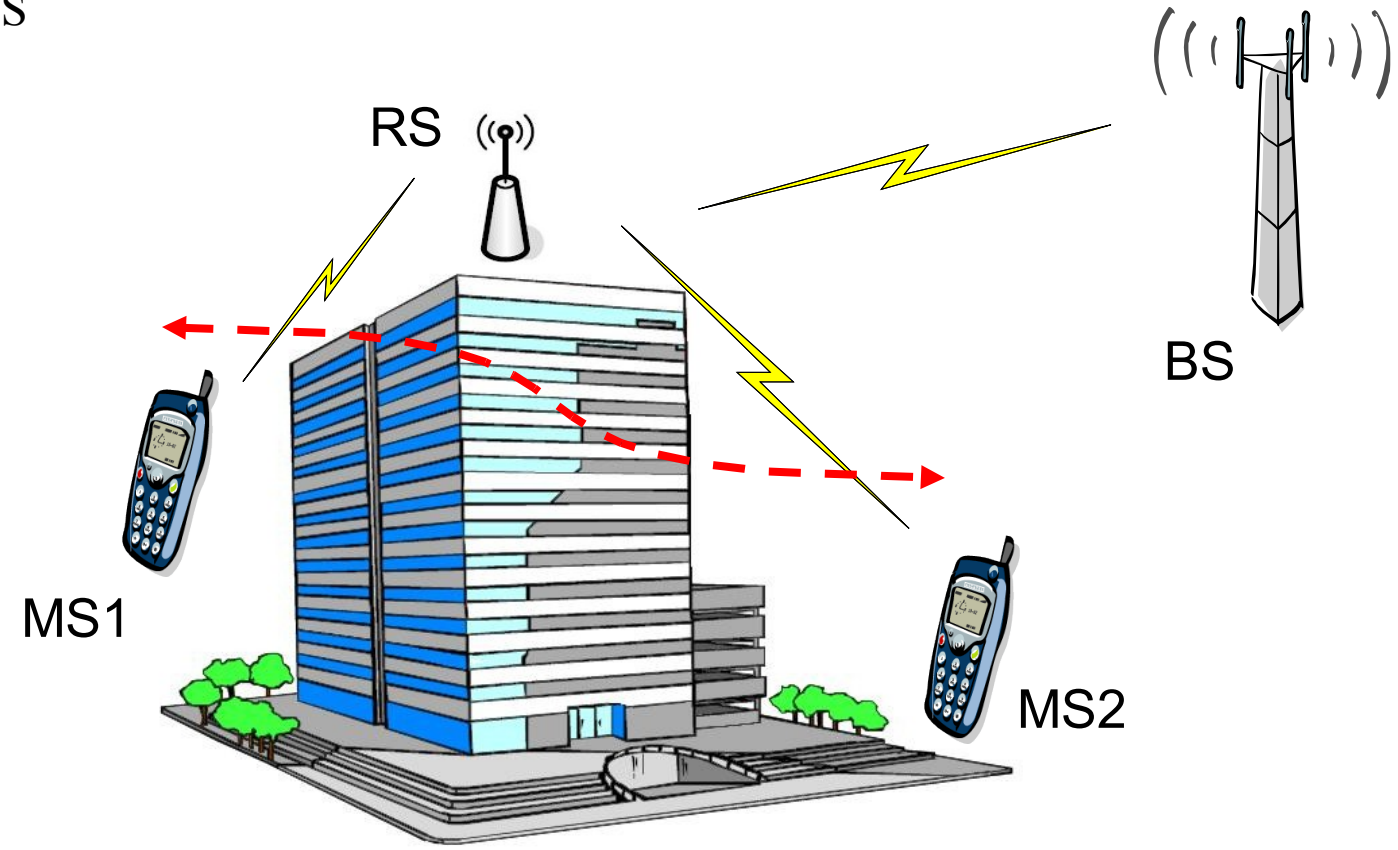
- **Example 1** : Military communication
  - Mobile user (e.g. soldier) communicates with another mobile user within the same squad/platoon



SMARTRelay

CC scenarios (2/4)

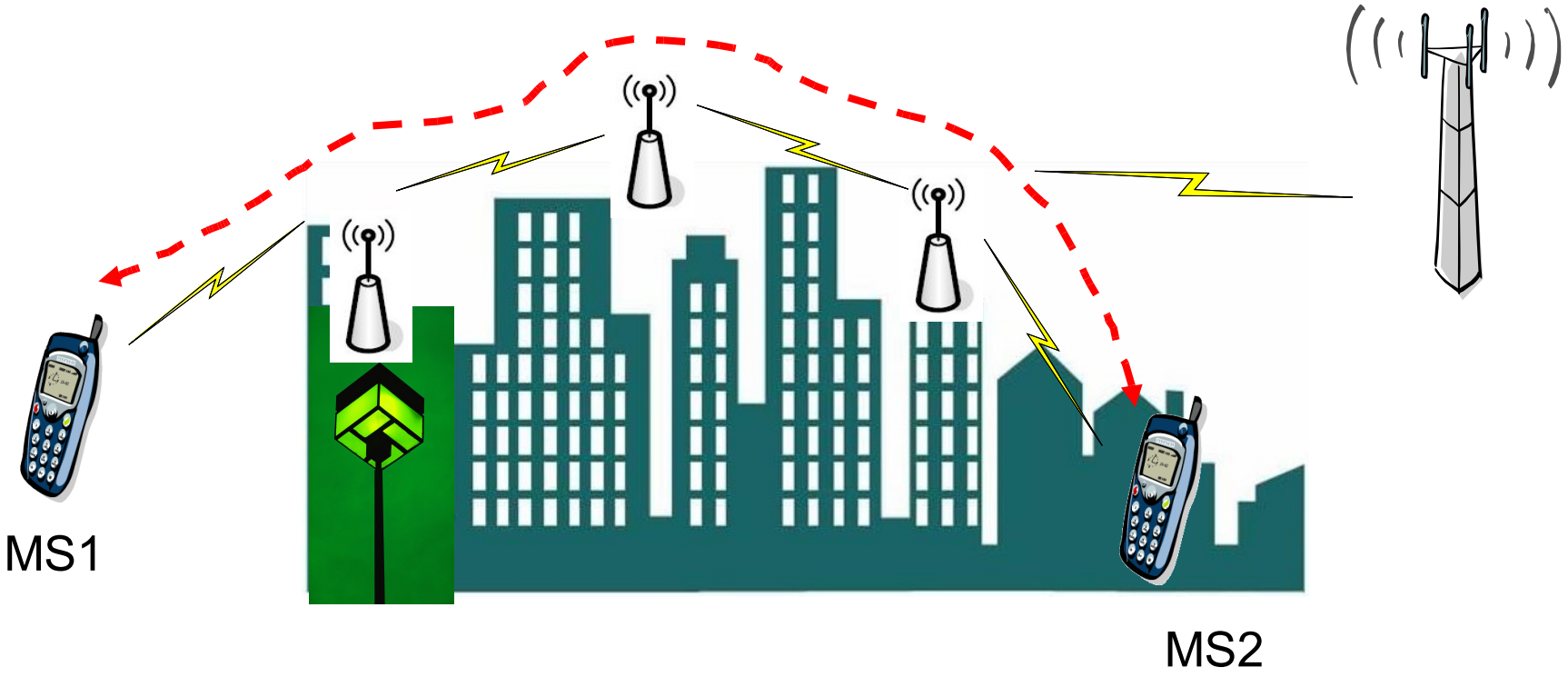
- **Example 2** : Communication in an office
  - Two MSs are located in the same building (same RS cell)
  - RF efficiency improved since data doesn't need to be transferred to the BS



SMARTRelay

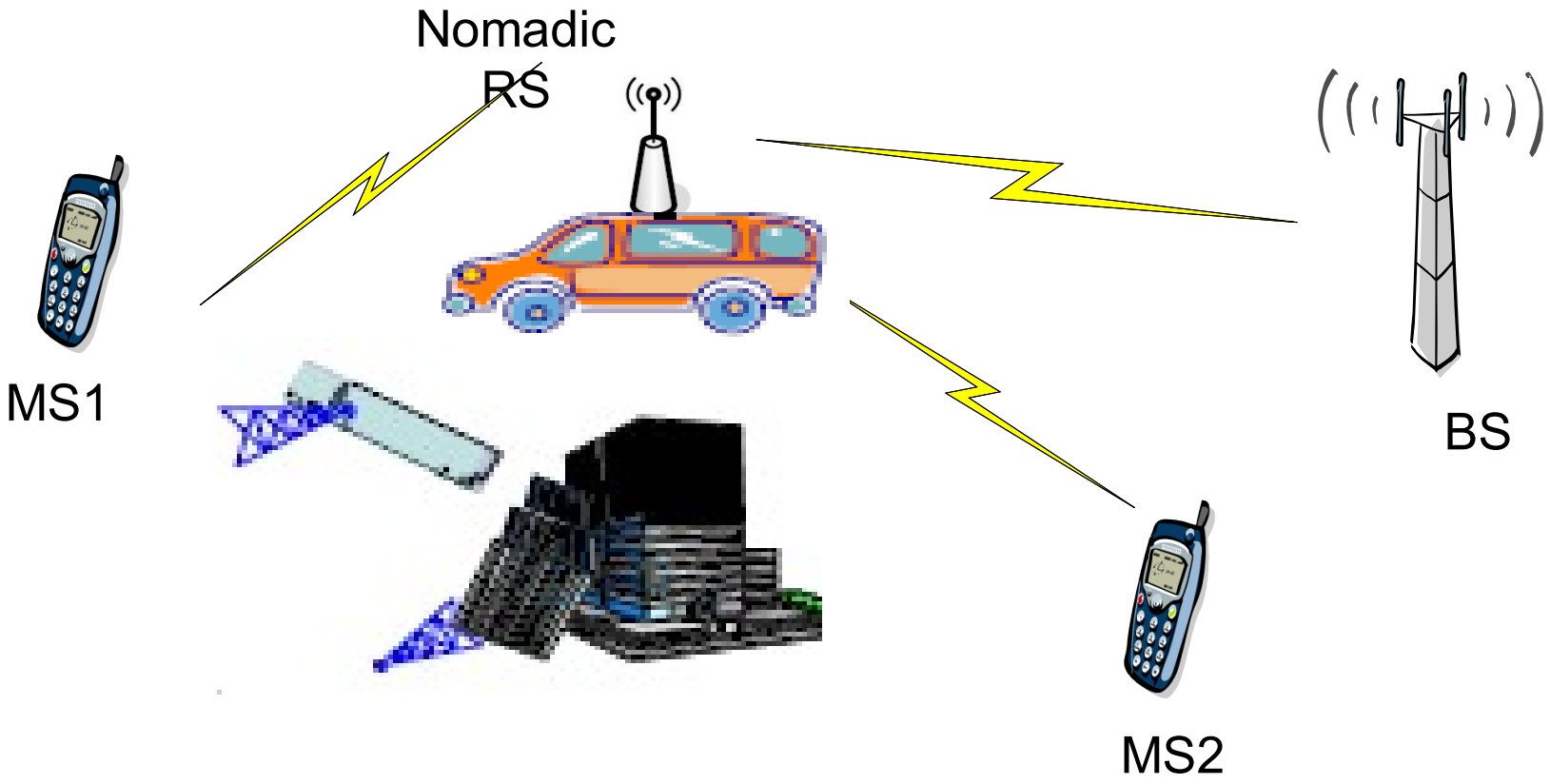
CC scenarios (3/4)

- **Example 3** : Communications among different RS cells
  - Two MSs are located in the same MMR cell but different RS cells



CC scenarios (4/4)

- **Example 4** : Emergency/Recovery situation

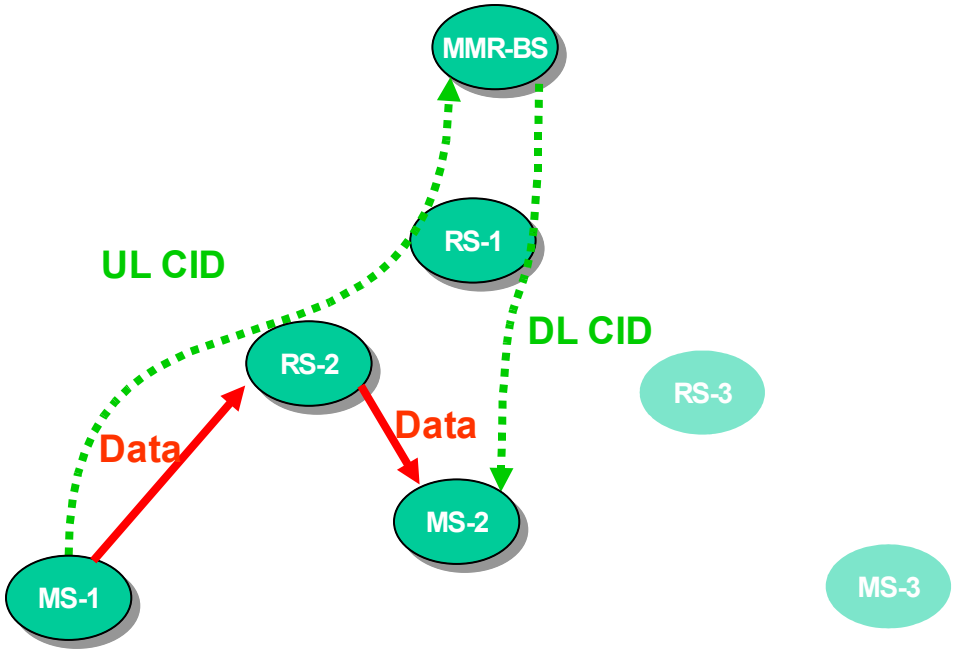


SMARTRelay

CC procedure (Summary)

- CC doesn't require any modification to the MS
  - It requires connections between MS and BS
  - 2 CID are used for 1 Cross-Communication

- The topology is still a **tree** (not a mesh)



SMARTRelay

Security with CC

Security in 802.16-2005 is based on a client/server architecture, where the BS is the server and the MS/RS are its clients.

Just as connections, security associations are established between the MMR-BS and the MS/RS.

The key management protocol provides the secure distribution of keying data from the MMR-BS to the MS/RS.

In order to support CC, the RS is required to decrypt and encrypt MS-RS-MS data plane traffic when the MMR-BS is bypassed.

The MMR-BS should provide the CC-enabled RS with the security parameters it needs to handle encryption of the data traffic it redirects.

SMARTRelay

Summary

- RS specifications should be divided into 2 parts
  - **Low-complexity Relay** stations for low cost solutions
  - **SMART Relay** stations for enhanced applications

- **SMART Relay** stations should handle
  - Routing protocol
  - Topology management
  - Power Saving
  - Security

- **SMART Relay** stations can manage Cross Communications
  - If allowed by the infrastructure owner and the country regulation
  - It should be an optional communication mode

- **SMART Relay** proposal should be considered in two categories
  - Relay Concepts
  - Routing (CC, Security, etc)