Considerations on Mobile Multi-hop Relay for IEEE 802.16

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Considerations on Mobile Multi-hop Relay for IEEE 802.16

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Objectives of this presentation

- Define our focus, in reply to the discussion raised last meeting, and
- Provide 2G/3G cellular repeater information to cover following topics out of Five criteria
  - Broad Market Potential
  - Technical Feasibility
  - Economic Feasibility

Contents

- Review of our focus
- Relay examples for cellular systems in Japan
  - Common Operator Repeater
  - Development of cellular repeater with echo suppresser
- Summary

Review of our focus [1/4]

- Comment raised at the last meeting:

  "Fixed RS for client relay shall be "Yes.""

- We need to revisit the "our focus" table.

Focus in MMR SG (Refer to C802.16-05/013)

		Ownership	
		Infrastructure	Client
Mesh		No	No
Relay	Fixed	Yes	No
	Nomadic	Yes	Yes
	Mobile	Yes	No

Review of our focus [2/4]

Infrastructure / Client mode definitions required

Item	Infrastructure Mode	Client Mode
Ownership	Each RS is owned by the service provider.	Each RS is owned by a client.
RS Location	Defined by the provider thus the RS coverage can be optimized.	Defined by each client, thus best-fit for it, meantime, the system optimization can be difficult.
Authentication	The BS can assume the RS is reliable.	Some measure must be required to find out if the RS is reliable, in the beginning of the RS installation, session initiation and during the communication.
Notes	The ownership by one provider may restrict a quick service introduction and service enhancement.	Some network level requirements shall be applied to each RS such as 24-hours operation, when it works as an network element. Any RS having MSs of the same owner can be regarded just as a gateway to “SS/MS.”

Review of our focus [4/4]

- Purpose
  - Coverage extension
  - Throughput enhancement
- Condition:
  - Based on 802.16-2004 and 16e with minimum modification

		Ownership	
		Infrastructure	Client
Mesh		No	No
Relay	Fixed	Yes	No -> Yes
	Nomadic	Yes	Yes
	Mobile	Yes	No

Relay examples for cellular systems in Japan [1/4]

- Common Operator Repeater
  - A Common Operator Repeater (Analog repeater) was jointly developed by four mobile operators in Japan as follows,

    (1) KDDI

    (2) NTT DoCoMo Inc.

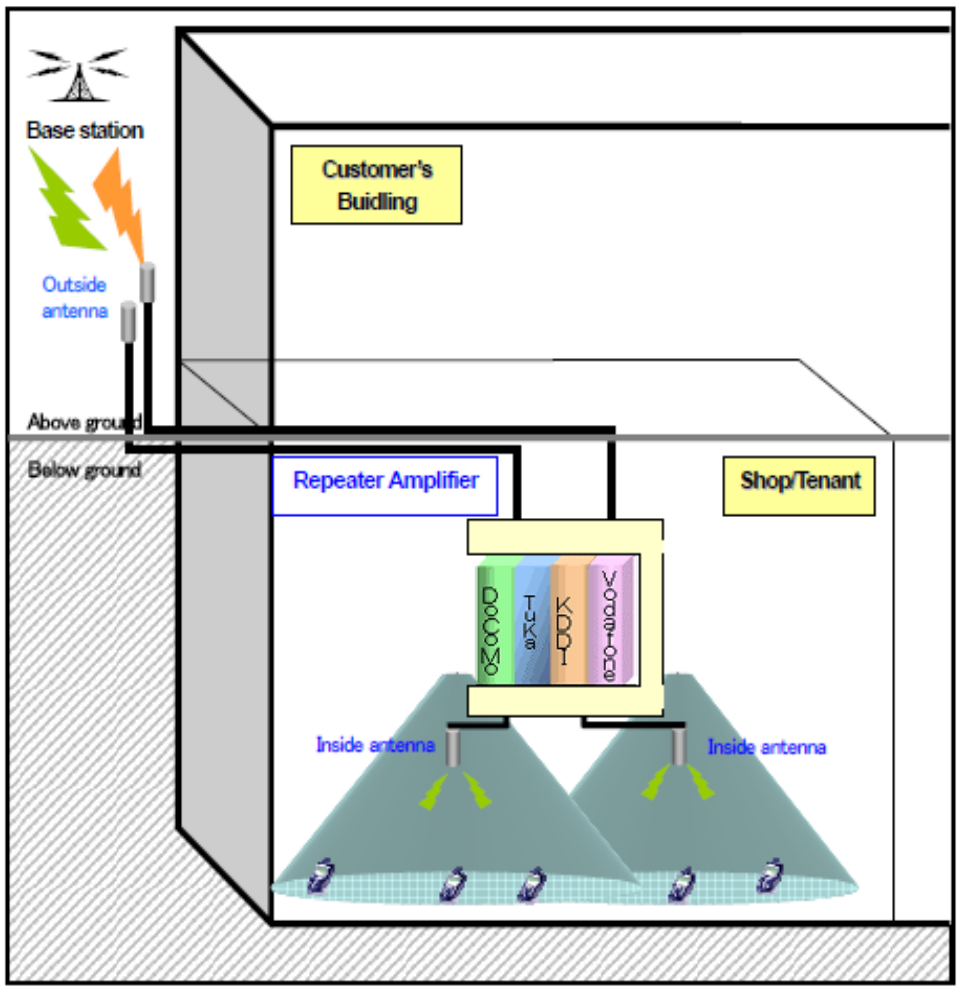
    (3) Vodafone K.K.

    (4) TU-KA Cellular Tokyo Inc.*

    *TU-KA Cellular Tokyo got merged with KDDI
  - The repeaters have been installed in optimal areas to deliver signals from outdoors to the area with communication difficulty, like stores underground and/or inside buildings.
  - Service started on June 22, 2005

Relay examples for cellular systems in Japan [2/4]

- Common Operator Repeater (cont.)



❖ Source http://www.vodafone.jp/english/release/2005/050622e.pdf

Relay examples for cellular systems in Japan [3/4]

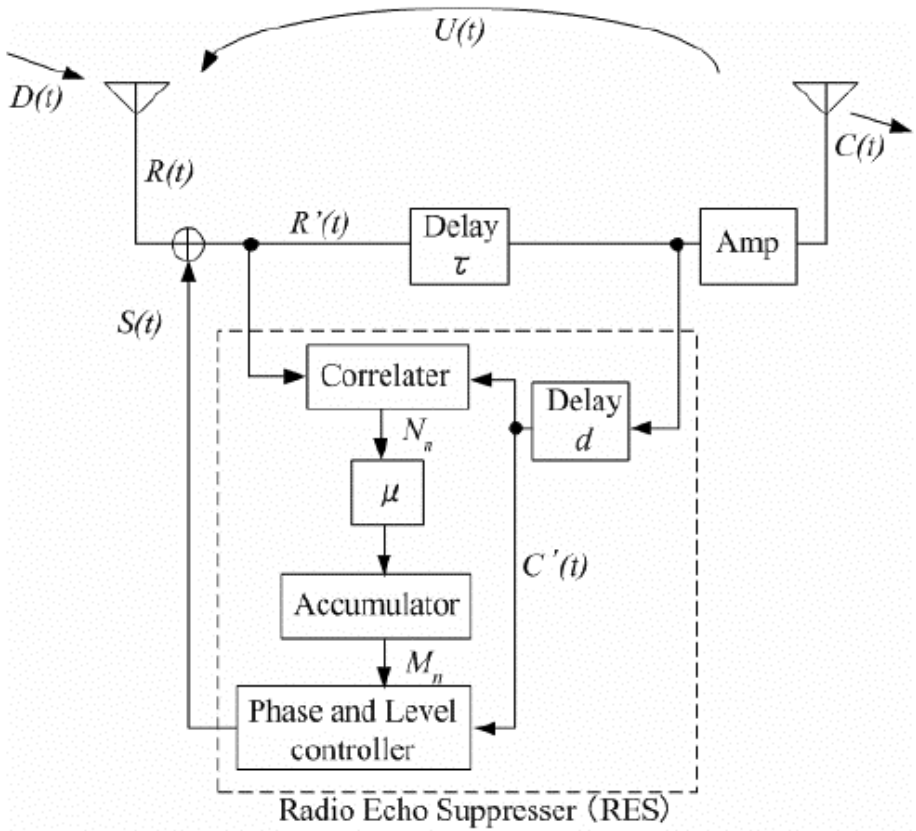
- Common Operator Repeater (cont.)

Major Characteristic of the repeater

Structure	Repeater amplifier	W×H×D	380×250×300 mm
		Weight	26 kg
	Antenna	Diameter	200 mm
		Height	80 mm
		Weight	0.5 kg
Services		Voice and packet services ・2G : NTT DoCoMo, Vodafone and TU-KA ・3G : KDDI	
Service areas		In-store (Service coverage may differ depending on the installation conditions such as the building structure, store interior, etc.)	

Relay examples for cellular systems in Japan [4/4]

- Development of cellular repeater with echo suppresser
  - CDMA based cellular repeater
  - Echo suppression using correlation characteristics of spread code in CDMA signal
  - An improvement of RSSI : Approx. 16dB
  - The repeater has already used for 3G cellular coverage extension in Japan
  - Developed by KDDI R&D Labs



❖ Reference T.Maeyama, T.Inoue : "Development of cellular repeater system with multiple radio echo suppresser", PIMRC 2004, Vol.4, pp.2323-2327, Sept.2004

Summary

- Review of our focus, re-defined.
- Relay examples for cellular system in Japan, presented
  - To increase number of subscribes, coverage area is very important
  - It is commonly understandable that any operator would like to spread a service area, at wide area, in a quick manner, at low cost.