

## Slides for “Proposed functional requirements for IEEE 802.16 TGj”

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# Overview

- Proposal for functional requirements based on the capability of relay system
  - Basic functions distinguishing the two relay capability[1]

Function	High capability relay	Low capability relay
Preamble transmission	Allowed	Not allowed
DL control (MAP, DCD/UCD, MOB_NBR-ADV) broadcast	Allowed	Not allowed
UL ranging processing	Allowed	Not allowed
RS-MS link control	Distributed but centrally coordinated at base station	Centralized at base station

- Multiple relay capabilities can be set from various combinations of functionalities.

# Proposed Functional Requirement

- A table of functional requirements
  - List of functional requirements
  - Each requirement is classified as either mandatory or optional function.
    - Functional requirements are largely defined for relay station.
    - Mandatory requirements are applied to base station as well.
    - Notes describes an exceptional case (i.e. requirement for low capability relay station).

## Functional Requirements (1/5)

Category	Name	Requirements	M	O	Notes
Backward compatibility	Backward compatibility	The specification shall define the base station which is able to accommodate legacy 16 mobile stations as well as relay stations.	√		
Configuration	Neighbor detection	The specification shall define the relay station enables neighbor detection at initial entry.	√		
	Capability management	The specification shall define the procedures to negotiate the functionalities between base station and relay station.	√		
	Path selection metric	The specification shall define the metrics of data path establishment from base station to mobile station via relay station.	√		
	Hop limit from BS to MS	The specification shall limit the maximum hop count from base station to mobile station via relay station.	2 hop	√	
Max. 3 hop (only for fixed relay station)				√	

## Functional Requirements (2/5)

PHY features	PHY frame structure for backward compatibility with legacy 16 mobile station	The specification shall define a frame structure for the link between the base station and the relay station, while the frame structure satisfies the backward compatibility with legacy 16 system. The frame structure shall support both relay station and the legacy 16 station in the same frame. The frame structure shall support at least one between in-band relay and multi-band relay.	√		
	Preamble transmission	The specification shall define relay station which enables to transmit the preamble.	√		Not allowed in low capability relay
	FEC block processing	The specification shall define relay station which enables FEC block encoding/decoding.	√		
	Link adaptation mechanism	The specification shall define link adaptation function (e.g. adaptive modulation and coding scheme) in relay station.		√	
	Transmission power control	The specification shall enable transmission power control in relay station.		√	

## Functional Requirements (3/5)

Control information processing	System information	The specification shall define relay station which enables the neighbor information process.	MOB_NBR-ADV message re-broadcast	√		Not allowed in low capability relay
			MOB_NBR-ADV message re-formation		√	
		The specification shall define relay station which enables the channel information process.	DCD/UCD message re-broadcast	√		Not allowed in low capability relay
			DCD/UCD message re-formation		√	
	MAP information	The specification shall define relay station which enables the downlink or uplink MAP process.	DL/UL MAP message re-broadcast	√		Not allowed in low capability relay
			DL/UL MAP message reformation		√	
	UL ranging processing	The specification shall define relay station which enables to process UL ranging.		√		Not allowed in low capability relay

## Functional Requirements (4/5)

Scheduling	Scheduler in relay station	The specification shall define relay station which enables to schedule packet transmission.		√	Scheduling in relay station shall be either coordinated at base station or distributed operation.
	ARQ processing	The specification shall define relay station which supports mobile station's ARQ operation.		√	
	HARQ processing	The specification shall define relay station which enables HARQ processing.		√	Not allowed in low capability relay.
Data delivery via relay	Unicast data delivery	The specification shall support unicast data delivery across the relay station.		√	
	Multicast/broadcast data delivery	The specification shall multicast or broadcast data delivery across the relay station.		√	Optional for low capability relay (directed by base station).
	MAC PDU processing	The specification shall deploy relay station which enables to configure MAC PDU.		√	

## Functional Requirements (5/5)

Mobility support	MS handover support	Relay station shall support the mobile station handover.	Handover negotiation message re-transmission	√	Optional for low capability relay (route change between relay stations within the same base station coverage)
			Handover negotiation control (i.e. handover triggering)	√	
	Mobile RS handover support	The specification shall support relay station with mobility.	√		
Security	Relay security	The specification shall utilize IEEE 802.16e security mechanism or extend it to support security between base station and relay station or between relay station and mobile station.	√		
	Authentication functionality in relay station	Relay station shall be able to authenticate the management messages of mobile stations which belong to it.	√	√	Not available in low capability relay



## Remarks

- Functions of IEEE 802.16 TGj system
  - Shall be consistent with 802.16 TGj PAR & 5 criteria[2].
  - Shall be backward-compatible with legacy 16 system.
  - Shall maximize the reuse of functions in the legacy 16 system.

## Reference

- [1] IEEE802 Tutorial: 802.16 Mobile Multihop Relay, IEEE 802.16mmr-06/006
- [2] Draft P802.16j PAR and Five Criteria, IEEE 802.16mmr-06/002r1