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| Re: | TGm SDD: Relay<br>IEEE 802.16m-08/040: Call for Comments and Contributions on Project 802.16m System Description Document (SDD) |
| Abstract | In this document we describe the relaying and scheduling models that should be supported in 16m. |
| Purpose | For consideration and adoption into the 16m SDD document. |
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# Relaying and Scheduling Models for 16m

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## Introduction

In this contribution we describe some basic attributes of the relay and scheduling model for relay support in 16m.

## Text Proposal

***[Insert the following text into section 15 of the SDD:]***

### 15.x Relay Model

Relaying in 16m is performed using a packet-based forwarding model. In the downlink, RSs receive bursts from their superordinate station (BS or RS) and decode them. They reconstitute the packets and perform CRC checks in order to determine if any uncorrectable errors have occurred. RSs may participate in HARQ and ARQ protocols to enable the superordinate station to retransmit packets that were received with errors. RSs may store data that was received for part of a frame or for one or more frames before transmitting it on to the next station. RSs do not transmit data that is known to contain errors on to the next station in the path. RSs operate according to the same paradigm in the uplink.

In 16m RSs may optionally be deployed within a sector in order to improve coverage and capacity. RSs are assigned unique stations ids. RSs transmit SCH, BCH and other DL control information to the MSs and subordinate RSs which associate with the RS. RSs allocate UL control channels for receiving UL control information from MSs and subordinate RSs. When an MS enters a sector in which RSs are deployed, the MS associates with one of the RSs or with the BS and receives DL control information from that station until it is handed over to another RS or BS. Overall control of the sector is maintained by the BS, while individual control functions such as scheduling may be implemented in a centralized or distributed manner.

### 15.x Scheduling Model

In a relay system scheduling can be performed in a centralized or distributed manner. In centralized scheduling the BS performs scheduling decisions for itself and all RSs within the sector. Centralized scheduling produces a more optimal schedule, but incurs additional overhead and delay. Centralized scheduling is also beneficial when multiple stations will transmit in a cooperative manner. In distributed scheduling, the BS and each RS make independent scheduling decisions for transmissions to/from their subordinates (MSs and subordinate RSs). Stations may coordinate their scheduling decisions on a slow timescale, but frame-by-frame scheduling

decisions are made in an independent manner. Distributed scheduling produces a suboptimal schedule, but incurs less overhead and latency.

In 16m we combine the benefits of distributed and centralized scheduling into a hybrid scheme which utilizes both paradigms. The BS and RSs determine for each MS whether the MS will be scheduled using centralized or distributed scheduling. For each frame, the BS determines the schedule for the MSs which are scheduled in a centralized manner. The BS sends this schedule in the form of the specific allocations to the RSs in advance of the frame to which the schedule applies. The BS and RSs then schedule the MSs for which distributed scheduling is used, respecting the allocations that have already been created by the BS via centralized scheduling.