Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Logical Control Connection for Connection-based Over-the-air Inter Base Stations Communications**
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Re:	IEEE 802.16h-06/016 – Call for comments and contribution in IEEE 802.16 LE TG
Abstract	We introduce a mechanism of Connection-based Over-the-air Inter base-stations Communications, called Logical Control Connection, which enables efficient, reliable, and secure base-station to base-station communications and particularly benefits the collaborative co-existence mechanisms.
Purpose	To be considered as the Connection-based Over-the-air Inter Base Stations Communications Mechanism applicable to 802.16h
Notice	
Release	
Patent Policy and Procedures	

Logical Control Connection for Connection-based Over-the-air Inter Base Stations Communications

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1. Introduction

Inter base-station (BS) communications are required for collaborative coexistence of 802.16 License-exempt (WirelessMAN-CX) systems, and the development of efficient, reliable, and secure methods for over-the-air inter-system communications is critical to guarantee the feasibility and overall efficiency of the collaborative coexistence mechanisms.

We propose a Connection-based Over-the-air Inter-BS Communication Mechanism, called Logical Control Connections (LCC), for inter WirelessMAN-CX system coordination, which can be established and maintained over the air with very low communications overhead incurred in terms of spectrum bandwidth, messaging latency, and hardware/software complexities.

2. Logical Control Connection

The method of Logical Control Connection is to establish a connection-based logical communication channel over the air between two base stations that manage two WirelessMAN-CX systems respectively. The idea of Over-the-air Logical Control Connection is based on the following two key concepts:

- Bridge Customer Premier Device (B-CPE)
- Coexistence Connections

2.1 Bridge Customer Premier Device (B-CPE)[1]

As shown in figure 1, a Bridge CPE (B-CPE) is located in the overlapping coverage areas of two/multiple WirelessMAN-CX systems, for which co-existence is required.

Note that if there no CPE located in the overlapping coverage areas of two/multiple WirelessMAN-CX systems, there should be no coexistence concerns.

A B-CPE, as a regular CPE, associates with one of the base station and establishes connections for data transmission services, which we refer to as Service Connections. The associated base station for data transmissions is called Service Base Station (S-BS) and the association is called Service Association.

A Bridge CPE is selected by its service BS for co-existence communications. Requested by its service BS, a bridge CPE associates with another interfering base station, called Coexistence Base Station (C-BS), with which the service BS requires establishing co-existence communications. The association between the Bridge CPE and the Coexistence BS is referred to as a coexistence association. After associated with the Coexistence BS, the

[1] CPE is used as the same terminology as Subscriber Station

Bridge CPE establishes connections with the Coexistence BS, and the established connections are called Coexistence Connections and are used only for coexistence communications.

A Logical Control Connection is established between the service BS and the coexistence BS over the service connection and the coexistence connection, with a bridge CPE as the relay.

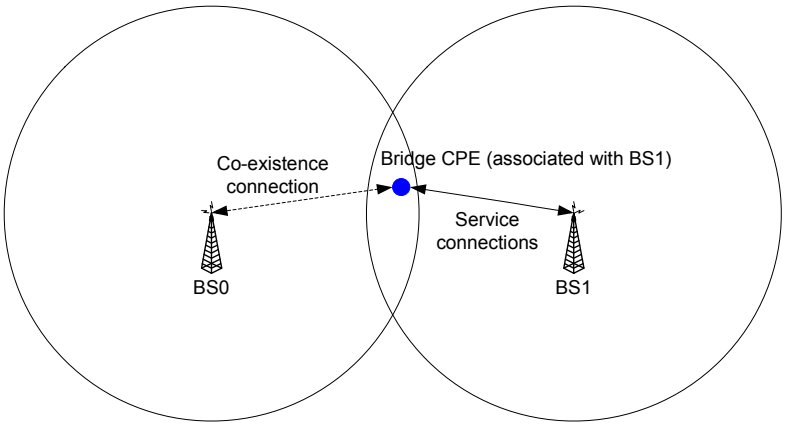

Figure 1 Bridge CPE and Coexistence Connections

2.2 Coexistence Connections

A coexistence connection, as a regular connection in nature, is a connection-based logical control channel that only carries communications for inter-system coexistence.

A Coexistence Connections is established and maintained between a bridge CPE and a coexistence BS, when requested by the service BS of the bridge CPE.

A Coexistence Connection can also be established and maintained between two base stations when they are within arranges of each other, as shown in figure 2. In this case, one of the base stations behaves as a CPE of the other base station.

A coexistence connection is established and maintained on physical RF channels that are occupied by the coexistence BS. No extra physical RF channel is consumed for coexistence connections.

The establishment and maintenances of a coexistence connection is performed along with data transmissions of the bridge CPE (or service BS, in the case of figure 2) controlled by the service BS. The procedures of establishment and maintenances for coexistence connections shall be in principle the same as those for service connections, and shall include operations of ranging, connection acquisitions, and etc.

The service BS shall guarantee that the establishment and maintenance operations of coexistence connections are not co-scheduled with service data transmissions on the bridge CPE. The high level scheme for co-scheduling resolutions is described in the next section.

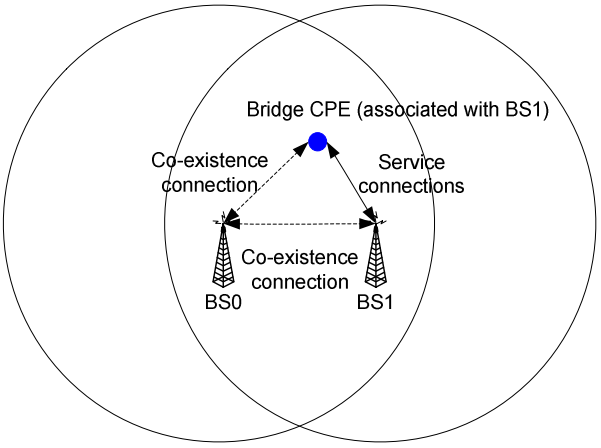

Figure 2 Coexistence Connections between two Base Stations

2.3 Over-the-air Coexistence Communications via LCC

Over-the-air coexistence communications via LCC is established between the service BS and the coexistence BS over the service connection and the coexistence connection, with a bridge CPE as the relay.

Functionalities of over-the-air coexistence communications are for coexistence purpose only, and include messaging for co-existence protocols, sensing measurement sharing, transmission parameters (such as frequencies, transmission power), etc.

For a Bridge CPE with a single TX/RX front end, it shall be guaranteed that service data transmissions are not co-scheduled (collided) with coexistence operations (i.e. connection establishment and maintenance, control message exchange, etc.) on the Bridge CPE. For this matter, the Service BS shall control and schedule the coexistence operations between the Bridge CPE and the Coexistence BS. The scheduling scheme for service data transmissions and coexistence operations are depicted in figure 3.

Without being scheduled for coexistence operations by the Service BS, the Bridge CPE only maintains communications with the Service BS for service data transmissions. Any coexistence messages or scheduling transmitted from the Coexistence BS is ignored by the Bridge CPE. When being scheduled for coexistence operations by the service BS, the Bridge CPE requests for and establishes communications with the Coexistence BS for coexistence operations. The coexistence operations can be performed up to the Coexistence Operation Period scheduled by the service BS. After the Coexistence Operation Period expired, the Bridge CPE resumes communications with the service BS and terminates communications with the coexistence BS.

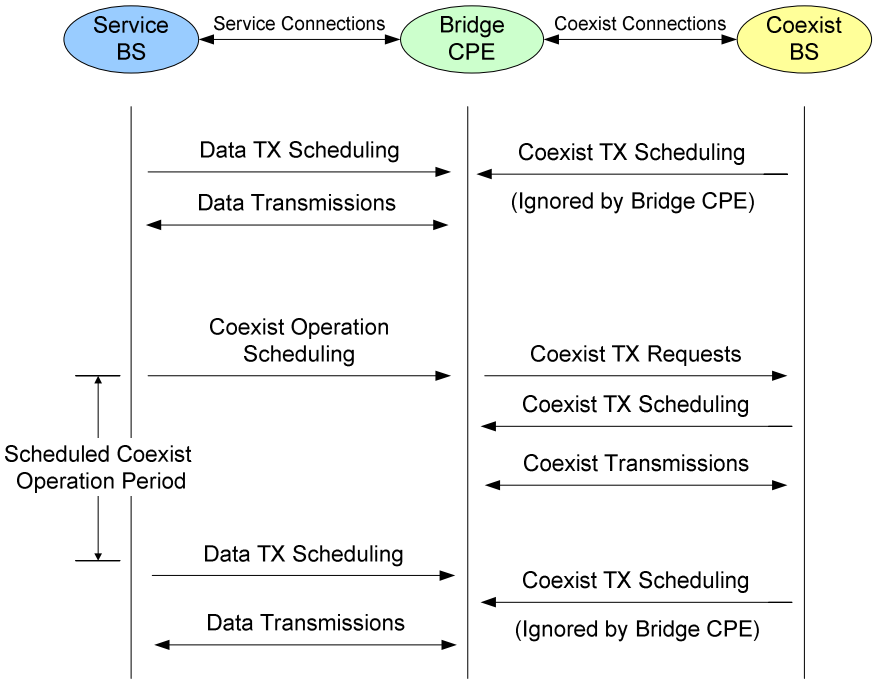

Figure 3 Scheduling of service data transmissions and coexistence operations for a Bridge CPE