Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**CP messages definition for credit token based co-existence protocol**
Date Submitted	**2006-07-10**
Source(s)	David Grandblaise Motorola Labs Parc Les Algorithmes Commune de Saint Aubin 91193 Gif sur Yvette, France Voice: +33 (0)1 6935 2582 Fax: +33 (0)1 6935 4801 mailto: david.grandblaise@motorola.com
Re:	Recirculation of Working Group Review of Working Document 80216h-06_015
Abstract	This contribution provides remedies to comment #121 of the session #43's Working Group Review. This contribution defines CP messages for credit token based co-existence protocol. The proposed text is intended for inclusion in section 15.5.2 of the working document [1].
Purpose	Text remedies to comment #121 of the session #43's Working Group Review.
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.

CP messages definition for credit token based co-existence protocol

David Grandblaise
Motorola

Overview

This contribution suggests remedies to action items from session #43's Working Group Review, namely Comment 121 of [2] – define CP messages for token protocol. The text proposal is intended to be included in the section 15.5.2 of the working document [1].

Specific editorial changes

Bold italic text is editorial instructions to the editor.

Text proposal for section 15.5.2

Add the text below in section 15.5.2

Attributes

Add the new rows of this table 9 in the existing table 9, page 82 in [1]

Table 9 – CP Message codes

Code	CP Message Name	CP Mesage Type	Protocol type	Direction
39	Advertisement Request	CP-REQ	TCP	BS -> BS
40	Advertisement Reply	CP-RSP	TCP	BS -> BS
41	Negotiation Process Request	CP-REQ	TCP	BS -> BS
42	Negotiation Process Reply	CP-RSP	TCP	BS -> BS
43	Credit Token Proposal Request	CP-REQ	TCP	BS -> BS
44	Credit Token Proposal Reply	CP-RSP	TCP	BS -> BS
45	Negotiation Results Request	CP-REQ	TCP	BS -> BS
46	Negotiation Results Reply	CP-RSP	TCP	BS -> BS
47	Granting Request	CP-REQ	TCP	BS -> BS
48	Granting Reply	CP-RSP	TCP	BS -> BS
49-255	reserved			

Add the new rows of this table 10 in the existing table 10, page 83 in [1]

Table h10 – TLV types for CP payload

Type	Parameter Description	Length (byte)	Comment
24	T_{Start}	16	In microsecond
25	T_{End}	16	In microsecond
26	$T_{Start\ Renting}$	16	In microsecond
27	$T_{End\ Renting}$	16	In microsecond
28	MRCTN	16	In number of credit token
29	$T_{Start\ Negotiation}$	16	In microsecond
30	$T_{End\ Negotiation}$	16	In microsecond
31	BS_CT	16	In number of credit token
32	x	16	
33	$T_{Start\ proposal}$	16	In microsecond
34	$T_{End\ proposal}$	16	In microsecond
35	P^{min}	16	In number of credit token
36	P^{max}	16	In number of credit token
37	Pr	16	In number of credit token
38	Credit token transaction confirmation	1	
39	Resource usage confirmation	1	
40	Resource usage confirmation notification	1	

15.5.2.39 Advertisement Request
Add this new section after section 15.5.2.38 in [1]

The master BS advertises to the surrounding slave BSs that it offers temporally some resources for renting.

Code: 39

Attributes are shown in Table h24.

Table h24 - Advertisement Request message attributes

BSID	BSID of the master BS
Operator ID	Operator ID of the master BS
T_{Start}	Starting time of the renting period
T_{End}	Ending time of the renting period
$T_{Start\ Renting}$	Starting time of the subframe under renting
$T_{End\ Renting}$	Ending time of the subframe under renting
MRCTN	Minimum number of credit tokens required for renting

15.5.2.40 Advertisement Reply

The interested slave BSs respond to the master BS with an Advertisement Reply message mentioning their interest or not to rent totally or partially the resources offered by the master BS.

Code: 40

Attributes are shown in Table h25.

Table h25 - Advertisement Reply message attributes

BSID	BSID of the slave BS
Operator identifier	Operator ID of the slave BS

15.5.2.41 Negotiation Process Request

The master BS provides the following information (Table h28) to the interested slave BSs to initiate the negotiation process.

Code: 41

Attributes are shown in Table h28.

Table h28 - Negotiation Process Request message attributes

$T_{Start\ Negotiation}$	Time from which the negotiation will start
$T_{End\ Negotiation}$	Time at which the negotiation will end

15.5.2.42 Negotiation Process Reply

In response, each slave BS informs the master BS about its first number proposition of credit token per time unit.

Code: 42

Attributes are shown in Table h29.

Table h29 - Negotiation Process Reply message attributes

BS_CT	Number of credit tokens per time unit
x	Fraction of $[T_{Start\ Renting}, T_{End\ Renting}]$ for which BS_CT applies for.
$T_{Start\ proposal}$	Starting time from which BS_CT applies for.
$T_{END\ proposal}$	Ending time from which BS_CT applies for.

15.5.2.43 Credit Token Proposal Request

The master BS informs the slave BSs about the minimal and maximal payoffs resulting from the scheduling process applied by the master BS.

Code: 43

Attributes are shown in Table h30.

Table h30 - Credit Token Proposal Request message attributes

P^{min}	Minimal payoff
P^{max}	Maximal payoff

15.5.2.44 Credit Token Proposal Reply

In response to the Credit Token Proposal Request message, the slave BS proposes a new BS_CT for the previous x, $T_{Start\ proposal}$ and $T_{End\ proposal}$ values.

Code: 44

Attributes are shown in Table h31.

Table h31 - Credit Token Proposal Reply message attributes

BS_CT	Updated number of credit tokens per time unit

The messages “Credit Token Proposal Request” and “Credit Token Proposal Reply” are repeated as long as $T_{End\ Negotiation}$ is not reached.

15.5.2.45 Negotiation Results Request

When $T_{End\ Negotiation}$ is reached, the master BS informs individually each winning slave BS about the number of credit token it has to provide to the master BS.

Code: 45

Attributes are shown in Table h32.

Table h32 - Negotiation Results Request message attributes

Pr	Number of requested credit token that the slave BS has to provide to the master BS after the negotiation

15.5.2.46 Negotiation Results Reply

In response to the “Negotiation Results Request” message, each slave BS confirms to the master BS that it allows performing the credit token transaction from the slave BS towards the master BS.

Code: 46

Attributes are shown in Table h33.

Table h33 - Negotiation Results Reply message attributes

Credit token transaction confirmation	The slave BS confirms the CT transaction towards the master BS.

15.5.2.47 Granting Request

Based on the “Negotiation Results Reply” message, the master BS grants the usage of its resources opened for renting to each winning slave BS which has performed the transaction.

Code: 47

Attributes are shown in Table h34.

Table h34 - Granting Request message attributes

Resource usage confirmation	The master BS approves the usage of the resources he has agreed to rent.

15.5.2.48 Granting Reply

In response to the “Granting Request” message, each slave BS notifies it will use the resources in the agreed won renting period.

Code: 48

Attributes are shown in Table h35.

Table h35 - Granting Reply message attributes

Resource usage confirmation notification	The slave BS notifies its willingness to use the resources he has been granted with.

References

[1] IEEE 802.16h-06/015: Part 16: Air Interface for Fixed Broadband Wireless Access Systems Amendment for Improved Coexistence Mechanisms for License-Exempt Operation, Working document; 2006-05-31
[2] 80216h-06_012r1: Working Group Review Commentary file from session #43.