Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Text remedies for the credit token based co-existence protocol section**
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Re:	Recirculation of Working Group Review of Working Document 80216h-06_015r1
Abstract	Follow up the session #44 meeting observations, this contribution provides some editorial text remedies on the credit token co-existence rental protocol section and related sections. The text remedies are proposed for sections 15.4.2.5 and 15.5.2 of the working document [1].
Purpose	Propose editorial text remedies in the credit token based co-existence protocol section (15.4.2.5) and related section (15.5.2).
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Text remedies for the credit token based co-existence protocol section

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Overview

Follow up the session #44 meeting observations, this contribution provides some editorial text remedies on the credit token co-existence rental protocol section and related sections. The text remedies are proposed for sections 15.4.2.5 and 15.5.2 of the working document [1].

Specific editorial changes

This section provides a list of changes to the draft document.

Blue text represents specific editorial additions.

~~Red strikethrough~~ text is to be deleted.

Black text is text already in the draft.

Bold italic text is editorial instructions to the editor.

Editorial text remedies for sections 15.4.2.5

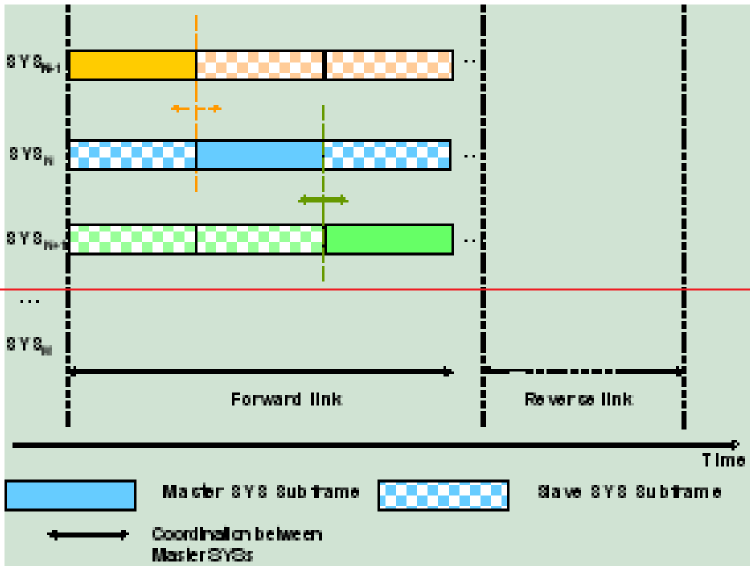
Replace the text of section 15.4.2.5 by the amended text below

15.4.2.5 Credit token based coexistence protocol

Spectrum sharing between several systems (S~~SYSs~~) can be achieved by the sharing a common MAC frame among different systems (operated by different operators) as exampled by Figure h 44. In such a MAC frame structure, dedicated portions (denoted as “master system sub-frames”) of the frame are periodically and exclusively allocated to a system (denoted as the “master system”) respectively in the forward and reverse link. The terminology used hereafter defines a slave system as a system that may operate during the other master systems sub-frames. With respect to this definition, the slave system sub-frames are the time intervals operating in parallel of the master systems sub-frames.

Additional flexibility can be provided by such a frame structure if the length of each master sub-frame (interference free sub-frame) can be dynamically adjusted as a function of the spatial and temporal traffic load variations of each system as stated in section 15.1.4.

To achieve this, this section proposes the dynamic coordination of the frame structure sharing between BSs when several master systems compete to share this common shared MAC frame.



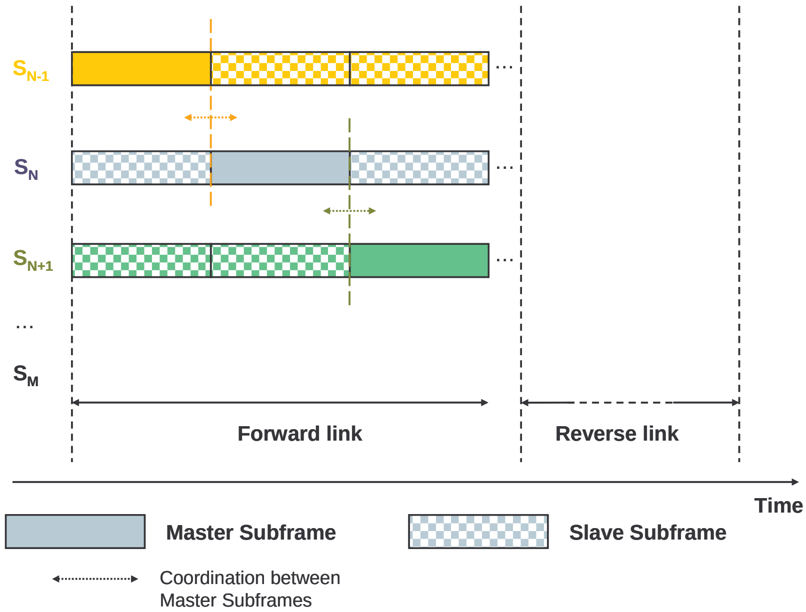


Figure h44—Example of TDD based MAC frame sharing structure between M SYSs

15.4.2.5.1 General principle

In order to resolve contention in accessing the channel and resources scheduling issues between systems, the first step consists of defining credit tokens and designing appropriate negotiation mechanisms. Then, on the basis of the usage of the credit tokens based mechanisms, the second step consists of managing dynamically (temporally) the bandwidth requests and grants mechanisms for the sharing of the master sub frames within the common MAC frame.

Based on the credit tokens transactions (assignment, release and awarding), these two steps provide the mechanisms to enable spectrum efficiency and a fair spectrum usage in a real time fashion, while ensuring both the master and slave systems QoS. These two steps enable to manage spectrum sharing between master systems themselves. The result is the dynamic shaping of the MAC frame structure sharing as a function of the traffic intensity variations, and the dynamic credit tokens ~~portfolio account~~budget of the master systems. The transaction mechanisms are detailed in the following sections.

15.4.2.5.2 Credit tokens assignment and usage principles

- Each system is initially allocated with a given credit tokens budget.
- Negotiation for spectrum sharing between systems is based on credit tokens transactions.
- Credit tokens transactions occur dynamically between a credit tokens offeror (master system owner of the radio resources during the active master sub-frame) and one or several credit tokens requesters (the other master systems).
- The negotiation occurs dynamically between master systems~~-~~ to agree the length of each master sub-frame as a function of the spatial and temporal traffic load variations need of each master system.

15.4.2.5.3 Negotiation between master systems

15.4.2.5.3.1 Definition and notation

- BS_N denotes the BS belonging to the master ~~SY~~S_N.
- BS_k denotes the BS belonging to the slave ~~SY~~S_k.
- Each BS_k can dynamically propose a number of credit tokens $BS\_CT^{(n)}_k$ at the n^{th} iteration. This proposal corresponds to the number of credit tokens per time unit corresponding to the BS_k during the n^{th} iteration of the negotiation phase.
- Resource scheduling is carried out by an auction inspired mechanism. The negotiation type used for the scheduling is dynamic in time. Starting from minimum number of credit tokens required (MRCTN) by the master BS to share its ~~share~~ radio resources, then the number of credit tokens is iteratively increased (at each iteration n) until the winning requesters remain.

15.4.2.5.3.2 Dynamic credit tokens based scheduling cycle

The dynamic scheduling cycle aims at coordinating between one BS_N of master ~~SY~~S_N and several BS_k of different slave ~~SY~~S_k. For the sake of simplicity, the cycle is illustrated (Figure h 45 and Figure h 46) for one BS_N and one BS_k of a given slave ~~SY~~S_k. The cycle is composed of different phases, and each phase can be composed of several sequences as follows.

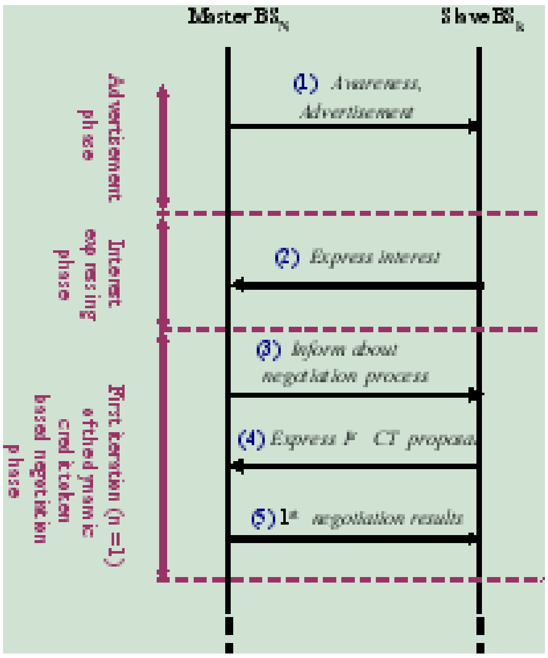


Figure h45—Dynamic (iterative) credit tokens based scheduling cycle (sequences (1) to (5))

A proposition to update the Figure h45 has been made in contribution IEEE C802.16h-06/080r1. If the contribution IEEE C802.16h-06/080r1 is accepted during session #45, please replace the above Figure h45 by the one proposed in IEEE C802.16h-06/080r1.

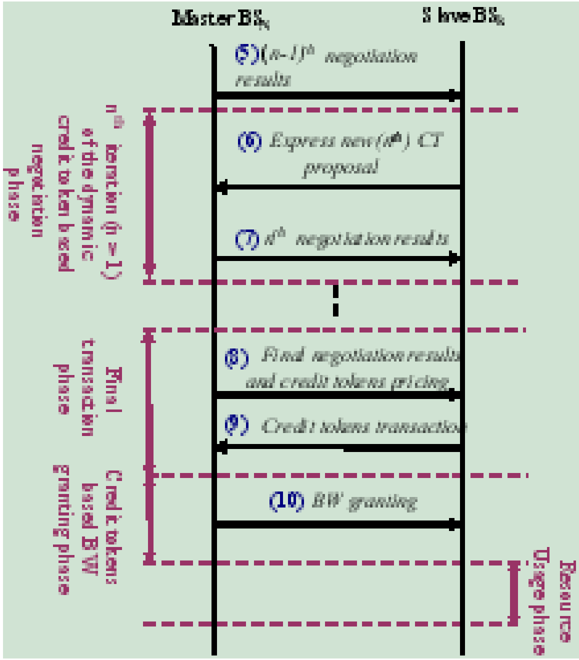
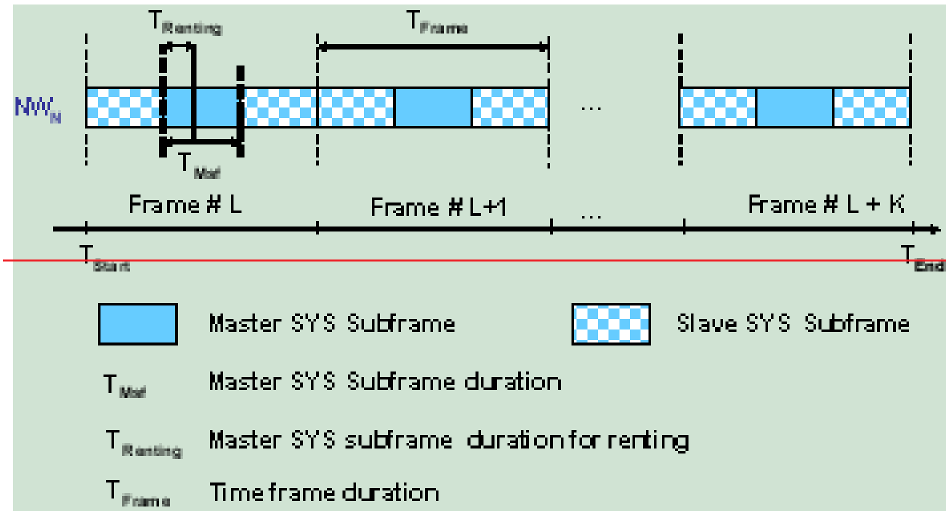


Figure h46—Dynamic (iterative) credit tokens based scheduling cycle (sequences (5) to (10))

15.4.2.5.3.3 Negotiation mechanisms between master systems

For each of the phase of the credit tokens based scheduling cycle presented in section 15.4.2.5.3.2 this section 15.4.2.5.3.3, describes the details of the enhanced mechanisms.



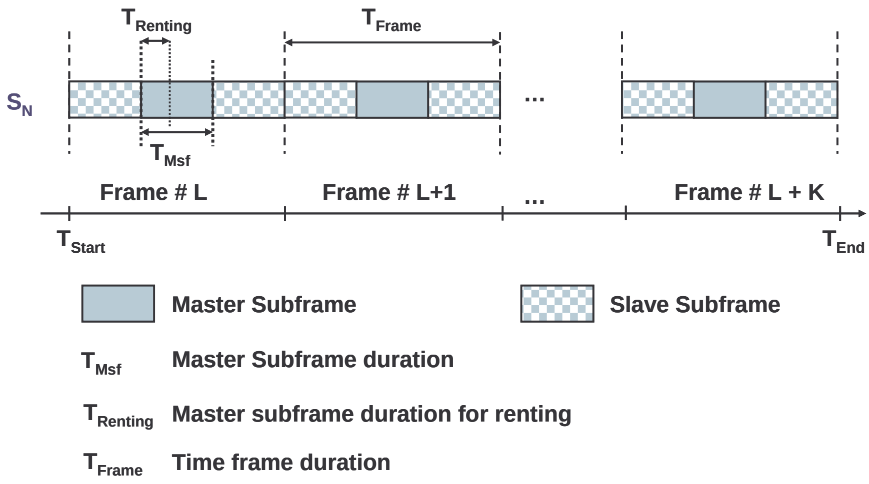


Figure h47—Simplified MAC frame structure illustrating master system sub-frame renting principle and associated notations

Advertisement~~ing~~/Awareness phase

This phase is composed of the single sequence (1) as follows:

- The master ~~SY~~S_N (offeror) advertises that its periodic assigned master sub-frame is open for renting (Figure h 47) from starting time T_{Start} to ending time T_{End} for a fraction ($T_{Renting}/T_{Msf}$) of its master sub-frame duration T_{Msf}. $T_{Renting} = T_{End\ Renting} - T_{Start\ Renting}$.
- The master ~~SY~~S_N proposes a minimum number of credit tokens required (MRCTN) for this renting. The MRCTN is expressed as a number of credit tokens per time unit.

Interest expressing phase

This phase is composed of the single sequence (2) as follows: each BS_k informs the master BS_N about its willingness (or not) to participate to the negotiation. If the BS_k is interested, it communicates its id_k to the master BS_N.

A proposition to insert here a new paragraph "Co-existence Conflicts Identification phase" has been made in the contribution IEEE C802.16h-06/080r1. If the contribution IEEE C802.16h-06/080r1 is accepted during session #45, please inset this new paragraph here.

First iteration (n = 1) of the dynamic credit tokens based negotiation phase

This phase is divided into 3 sequences as follows:

- In sequence (3), the master BS_N provides the following information to the slave BS_ks that have expressed the interest to participate to the negotiation:
  - o $T_{Start\ Negotiation}$: time from which the negotiation phase will start,
  - o $T_{End\ Negotiation}$: time at which the negotiation phase will end ($T_{End\ Negotiation} < T_{Start}$),
  - o <u>Note</u>: For this first iteration (n = 1), the initial $\{id_k\}$ is noted $\{id^{(1)}_k\}$.
- In sequence (4), each BS_k provides the following information to BS_N: $CTP^{(1)}_k = \{BS\_CT^{(1)}_k$, ~~x~~$frac_k$, $T_{Start\ k}$, $T_{End\ k}\}$ where:
  - o $CTP^{(1)}_k$ is the credit tokens proposal vector of BS_k at the first (n = 1) iteration of the negotiation with the master BS_N. $CTP^{(1)}_k$ is composed of $BS\_CT^{(1)}_k$, ~~x~~$frac_k$, $T_{Start\ k}$ and $T_{End\ k}$
  - o $BS\_CT^{(1)}_k$ is the number of credit tokens per time unit proposed by BS_k for the first iteration,

- o $\cancel{x}frac_k$ is the fraction of $T_{Renting}$ for which $BS\_CT^{(1)}_k$ applies for,
- o $[T_{Start\ k}, T_{End\ k}]$ is the time interval for which $BS\_CT^{(1)}_k$ applies for. $[T_{Start\ k}, T_{End\ k}] \subset [T_{Start}, T_{End}]$.

— In sequence (5), BS_N performs the following action:

- o Given the set of intervals $\{[T_{Start\ k}, T_{End\ k}]\}$ received from different requesters $\{id^{(1)}_k\}$, BS_N partitions $\{[T_{Start}, T_{End}]\}$ into contiguous time segments $\{TS_m\}$. Each TS_m corresponds to a time window (integer number of T_{Frame}) in which a subset of intervals of $\{[T_{Start\ k}, T_{End\ k}]\}$ overlap.
- o The different requesters $\{id^{(1)}_k\}$ assigned to a given TS_m are identified by $\{id^{(1)}_{k,m}\}$. $\{id^{(1)}_{k,m}\}$ compete for each TS_m. Each involved requesters $id^{(1)}_{k,m}$ competes with his respective $CTP^{(1)}_k$.
- o Then, for each TS_m the master BS_N calculates the payoff $P^{(1)}_k = BS\_CT^{(1)}_k * \cancel{x}frac_k * T_{Renting} * N_{Frame\ m}$ for each requesters k, and searches the subset ($\{id^{(1)}_{k,m}\}_{selected}$) of $\{id^{(1)}_{k,m}\}$ such as $sum(x_k) = 1$ and $sum(P^{(1)}_k)$ is maximal. $N_{Frame\ m}$ is the number of frames within TS_m ($N_{Frame\ m} = TS_m/T_{Frame}$).
- o For each TS_m, BS_N informs all $\{id^{(1)}_{k,m}\}$ about $Pmin^{(1)\cancel{,(1)}}_{\cancel{min}\ m}$ and $Pmax^{(1)\cancel{,(1)}}_{\cancel{max}\ m}$ where $Pmin^{(1)\cancel{,(1)}}_{\cancel{min}\ m}$ is the minimal payoff from $\{id^{(1)}_{k,m}\}_{selected}$ and $Pmax^{(1)\cancel{,(1)}}_{\cancel{max}\ m}$ is the maximal payoff from $\{id^{(1)}_{k,m}\}_{selected}$ during the first iteration. With this approach, each BS_k is directly informed whether it has been selected or not, and has some information on how far it is from $Pmin^{(1)\cancel{,(1)}}_{\cancel{min}\ m}$ while still having some information on $Pmax^{(1)\cancel{,(1)}}_{\cancel{max}\ m}$. This approach enables to keep the privacy of competing $\{id^{(1)}_{k,m}\}$ on TS_m.

n^{th} iteration of the credit dynamic tokens based negotiation phase

This phase is composed of 2 sequences as follows:

— In sequence (6):

- o If $P^{(1)}_k < Pmin^{(1)}_{\cancel{min,}\ m}$, this means that BS_k has not been selected for being granted the resources he has requested for during the first iteration n = 1. More generally speaking, for n>1, if $P^{(n-1)}_k < Pmin^{\cancel{min,}(n-1)}_m$, this means that BS_k has not been selected for being granted the resources he has requested for during the $(n-1)^{th}$ iteration.
- o If $P^{(n-1)}_k < Pmin^{\cancel{min,}(n-1)}_m$ and if BS_k is still interest to be allocated with the additional resources he initially requested for, it can propose a new $BS\_CT^{(n)}_k$ for the n^{th} iteration. Then, BS_k computes the new $P^{(n)}_k = BS\_CT^{(n)}_k * \cancel{x}frac_k * T_{Renting} * N_{Frame\ m}$ where $\cancel{x}frac_k$, $T_{Renting}$ and $N_{Frame\ m}$ are fixed for all n on TS_m.
- o If $P^{(n)}_k > P^{(n-1)}_k$ and $P^{(n)}_k > Pmin^{\cancel{min,}(n-1)}_m$, BS_k expresses its interest to keep on participating in the negotiation with the new proposal $P^{(n)}_k$. In that case, it informs BS_N with its new (update) value of $BS\_CT^{(n)}_k$. In case $P^{(n)}_k = P^{(n-1)}_k$ or $P^{(n)}_k < Pmin^{\cancel{min,}(n-1)}_m$, BS_k leaves the negotiation phase and will not be granted with the additional resources he asked for.

— In sequence (7), BS_N updates $\{id^{(n-1)}_{k,m}\}$ into $\{id^{(n)}_{k,m}\}$. Based on the new received proposals $\{BS\_CT^{(n)}_k\}$ for each TS_m, the master BS_N calculates the new payoff $P^{(n)}_k = BS\_CT^{(n)}_k * \cancel{x}frac_k * T_{Renting} * N_{Frame\ m}$ for each requester k who still participates to the negotiation. Then, for each TS_m, BS_N searches the subset ($\{id^{(n)}_{k,m}\}_{selected}$) of $\{id^{(n)}_{k,m}\}$ such as $sum(\cancel{x}frac_k) = 1$ and $sum(P^{(n)}_k)$ is maximal. Next, BS_N performs the same actions as in sequence (5): for each TS_m, BS_N informs all $\{id^{(n)}_{k,m}\}$ about $Pmin^{\cancel{min,}(n)}_m$ and $Pmax^{\cancel{max,}(n)}_m$ where $Pmin^{\cancel{min,}(n)}_m$ is the minimal payoff from $\{id^{(n)}_{k,m}\}_{selected}$ and $Pmax^{\cancel{max,}(n)}_m$ is the maximal payoff from $\{id^{(n)}_{k,m}\}_{selected}$ during the n^{th} iteration.

Final negotiation results and credit tokens pricing

This phase is composed of two sequences as follows:

— In sequence (8):

- o As long as $T_{Start\ Negotiation}$ has not been reached (i.e. the negotiation phase duration has not yet elapsed), n is increased and the credit tokens based negotiation phase mechanisms of the previous paragraph "n^{th} iteration of the dynamic credit tokens based negotiation phase" are applied.
- o When $T_{Start\ negotiation}$ has been reached, negotiation phase is over. None BS_k can propose a new credit token proposal. $\{id^{(n\ final)}_{k,m}\}_{selected}$ is derived. At this point, BS_N derives the final credit tokens price BS_CPA_k (expressed as a number of credit tokens per time unit) for each TS_m and each k from $\{id^{(n\ final)}_{k,m}\}$. For each k and m, BS_CPA_k can correspond to the $BS\_CT^{(final)}_k$, or for example can follow another price derivation method.

— In sequence (9), each BS_k is requested to provide $Pr_k = BS\_CPA_k * \cancel{x}frac_k * T_{Renting} * N_{Frame\ m}$ credit tokens to BS_N to be allowed to use the resources it has been assigned after the negotiation on its corresponding TS_m. Provided that Pr_k does not exceed the credit tokens budget of BS_k, the credit tokens transaction between BS_N and each BS_k is performed.

Credit tokens based bandwidth granting phase

This phase is composed of the single sequence (10). During this phase, BS_N grants the resource to each BS_k who has successfully performed the credit transaction operation in sequence (9).

Resource usage phase

After BS_k has been granted with the resources, BS_k can use them during during $\cancel{x}frac_k * T_{Renting}$ time unit of $\cancel{SY}S_N$ and for $N_{Frame\ m}$ frames from the beginning on its corresponding TS_m.

15.4.2.5.4 Inter BSs communication

The credit tokens mechanisms (section Inter BSs communication) require inter BSs communication between different systems. This inter BS communications is necessary to exchange the parameters related to the credit tokens based negotiation cycle.

The primitive parameters include: T_{Start}, T_{end}, $T_{End\_Renting}$, $T_{Start\_Renting}$, $T_{Msf,}$ MRCTN, id_k, $BS\_CT^{(n)}{}_k$, $\cancel{x}frac_k$,, T_{Start_k}, T_{End_k}.

The derived parameters include: TS_m, $\{id^{(n)}{}_{k,m}\}_{selected}$, $Pmin^{\cancel{min,}(n)}{}_{m}$, $Pmax^{\cancel{max,}(n)}{}_{m}$.

These parameters are stored into the regional LE DB and into the local database of each LE BS of the shared distributed system architecture (section 15.15).

The information exchange about these parameters between these databases and the RADIUS/BSIS servers is performed by IP based wired using the co-existence protocol (CP). This inter BS communication is supported by the inter system messages defined in the shared distributed system architecture (section 15.15).

The inter BS communications to support the ~~signaling~~ messages related to the awareness/advertisement sequence of the credit tokens based co-existence protocol can also be implemented by secured over the air mechanisms described in section 15.4.2.5.5.

15.4.2.5.5 Radio Resources Sharing Opportunities Advertisement Discovery

Over the air signaling for the first phase (advertisement) of the negotiation cycle would be also of great support to facilitate urgent (critical time) radio resources sharing opportunities discovery between IEEE WirelessMAN-CX systems themselves, but also between IEEE WirelessMAN-CX systems and non IEEE WirelessMAN-CX systems. This section describes ~~signaling~~ discovery messages and procedures so that:

- Master BSs can advertise periodically to the neighbouring slave BSs about their offers of radio resources for renting. This enables the slave BSs to be aware of master BSs' offers.

- Slave BSs can inform periodically the surrounding cells about their search of radio resources sharing opportunities for renting. This enables slave BSs to inform the master BSs that they are looking for temporally some additional radio resources.

Specific master BS and slave BS downlink time intervals (TBD) are used to support the over the air advertisement discovery messages in support of the credit tokens based negotiation. These time intervals~~messages~~, not yet defined, are temporary called respectively MATI (Master Advertisement Time Interval) and SATI (Slave Advertisement Time Interval).

Usage of the advertisement discovery MAC frame structure

The usage of MATI and SATI is described in this paragraph.

- The MATIs are dedicated to master BS transmissions in downlink.

- Each MATI is used by a master BS in downlink for broadcasting. At a given time, each MATI can only be used by a single BS among the co-existence neighbourhood. However, a same MATI can be used by different BSs at different times.

- Each master BS can use any MATI provided it is not already used by any other MATI BS of the co-existence neighbourhood.

- MADD (Master Advertisement Discovery Descriptor) message is sent in MATI (Section 6.3.2.3.64).

- The MATIs are ranked in each *Advertisement discovery sequence* in such a way that the first MATI is assigned to the master BS whose renting period will occur first (i.e. min of the T_Start_M), the second MATI is assigned to the master BS whose renting period will occur in second, and so on. Re-ranking is updated dynamically each time a new master BS is arriving. This mechanism avoids the SSs of the slave cells (see paragraph "*Advertisement discovery from master cell by slave cell*" below) to scan all MATIs when the slave cells have to find very shortly some available resources to rent. In this manner, they have directly knowledge of the next available resources they can propose credit tokens for.

- Each master cell releases the MATI it is using when its negotiation starting time has elapsed. This enables new arriving master cells to use this MATI (eventually after the re-ranking) to advertise incoming channels reuse opportunities.

- The SATIs are dedicated to slave BS transmissions in downlink.

- Each SATI is used by a slave BS in downlink for broadcasting. Each SATI can only be used by a single BS among the co-existence neighbourhood. However, a same SATI can be used by different slave BSs at different times.

- Each slave BS can use any SATI provided it is not already used by any other slave BS of the co-existence neighbourhood.

- SADD (Slave Advertisement Discovery Descriptor) message is sent in SATI (Section 6.3.2.3.65).

- A "master" SS is a SS belonging to a master cell. A "slave" SS is a SS belonging to a slave cell.

- The MATI and SATI time positions are known by the "master" and "slave" SSs.

- There are no direct RF communications between the master and slave BSs. The master-slave BS communications are performed via master and slave SSs which act as RF bridges to convey the information as follows:

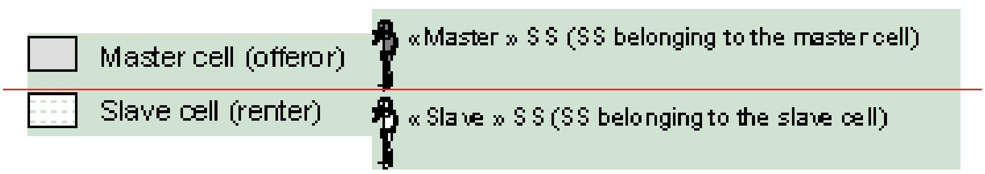
    o A "slave" SS performs the RF bridge between its slave BS and the master BS (provided the coverage of the master cell overlaps with the slave cell area, and this slave SS is located in the overlapping area).

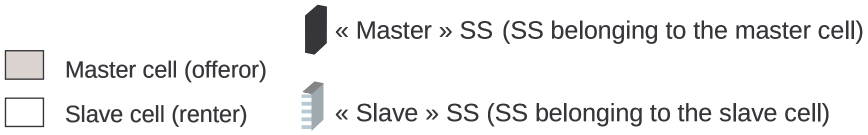
    o A "master" SS performs the RF bridge between its master BS and the slave BS (provided the coverage of the slave cell overlaps with the master cell area, and this master SS is located in the overlapping area).

- Slave SSs in the overlapped (master/slave) cell area listen to the MATIs. Master SSs in the overlapped (master/slave) cell area listen to the SATIs.

15.4.2.5.5.1 Mechanisms enabling the discovery and the exploitation of the master cells originated advertisement discovery messages by the slave cells

This paragraph describes the mechanisms enabling the discovery and the exploitation of the master cells originated advertisement discovery messages by the slave cells. The terminology used in the following is:





These mechanisms are described by the different steps as illustrated in the following:

1- Policy instructions to the slave SSs by the slave BS

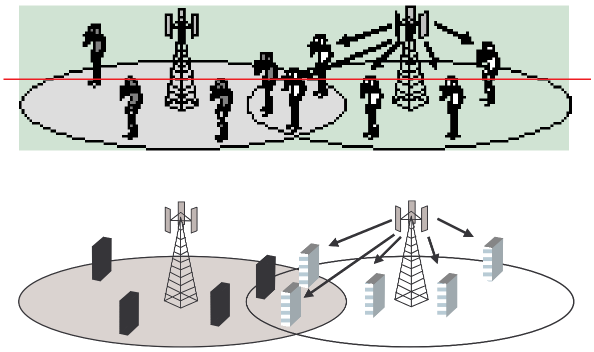


Figure h48—Policy instructions to the slave SSs by the slave BSs

- During this step, the slave BS initially instructs (by broadcasting) its SSs (in red) about the behaviours they have to adopt when some of these SSs get the messages from the different MATIs.

- The behaviour is instructed by the ADPD (Advertisement Discovery Policy Descriptor) message (section 6.3.2.3.66) specifies when some SSs (located in the overlapped area between this slave cell and surrounding master cells and getting MADD message from master BS) associated to this slave BS have to report the MADD information conveyed in MATI towards this slave BS.

- The slave SSs that can hear the MATIs and meeting the requirements sent in ADPD are the only SSs that are allowed to make the RF bridge between the master and slave cells. This means, the policy rules the transmissions from any slave SS towards the slave BS when these SSs are mandated to get feedback about the MATIs proposals. This mechanism avoids having incessant transmissions from the slave SSs towards the slave BS when the MATIs are not aligned with the slave BSs strategy. This saves bandwidth. Any policy can be established. Moreover, the policy can be adapted dynamically in time by the slave BS.

2- Detection and identification of the MATIs content by the slave SSs

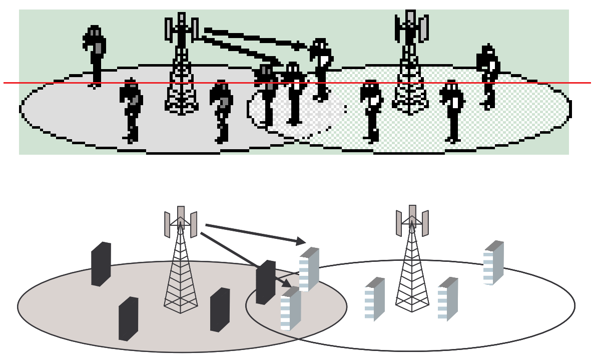


Figure h49—Detection and identification of the MATIs content by the slave SSs

- During this step, the slave SSs in the overlapping area between the master cell and their slave cell listen to the different MATIs sequentially. For each master cell, these slave SSs can get the information sent in the MADD message (Section 6.3.2.3.64).

- Provided the MADD message information received and the ADAP message received about the policy (section 6.3.2.3.66) established by the slave BS, the slave SS is able to decide whether it has to transmit this information to the slave BS or not.

3- Relaying of the MATIs content to the slave cell by the slave SSs

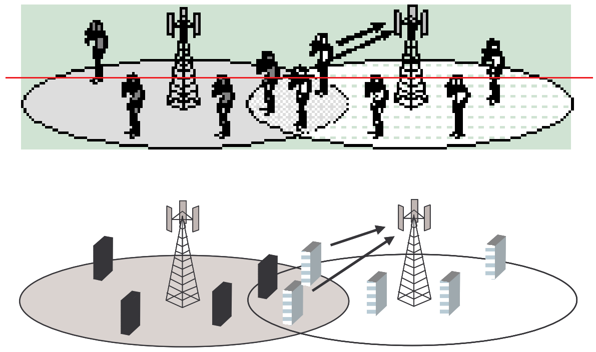


Figure h50—Relaying of the MATIs content to the slave cell by the slave SSs

- In case the policy requirements are met, the information collected by the slave SS is conveyed to the slave BS. The information the slave SS sends to its BS is the content of the MADD message.

- In order to ensure this information is appropriately received by the slave BS, the information is sent by several slave SSs (e.g. 2 slave SSs circulate this information to the slave BS in Relaying of the MATIs content to the slave cell by the slave SSs). This ensures both reliability and security check.

Note: In case the policies requirements sent in ADAP are not met, the slave SSs do not transmit the information. However, it would be possible for the slave SS to convey the information about the list LC (message included in MADD) to its slave BS since it will provide it some further information about other radio resources renting opportunities on other channel (frequency domain). This decision to send the LC information can be ruled by the policy.

4- Master BS - Slave BS communication through the backhaul

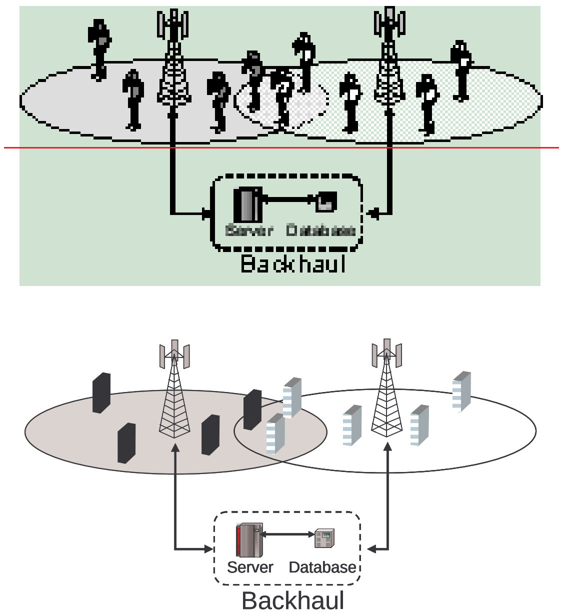


Figure h51—Master-Slave BS communication through the backhaul

After step 3, the slave BS knows the IP_Proxy_address_M (Section 6.3.2.3.64) associated to the master cell. Accordingly, the communications between master and slave cells (BSs) is performed through the backhaul to make the negotiation (Master-Slave BS communication through the backhaul) with the co-existence protocol (CP). The remaining phases of the credit tokens based negotiation cycle is performed via this backhaul with IP based communications using server(s) and database(s).

15.4.2.5.5.2 Mechanisms enabling the discovery and the exploitation of the slave cells originated requests discovery messages by the master cells

This paragraph describes the mechanisms enabling the discovery and the exploitation of the slave cells originated request discovery messages by the master cells. The terminology used in the following is the same as in the previous paragraph.

These mechanisms are described by the different steps illustrated as follows:

1- Detection and identification of the SATIs content by the master SSs

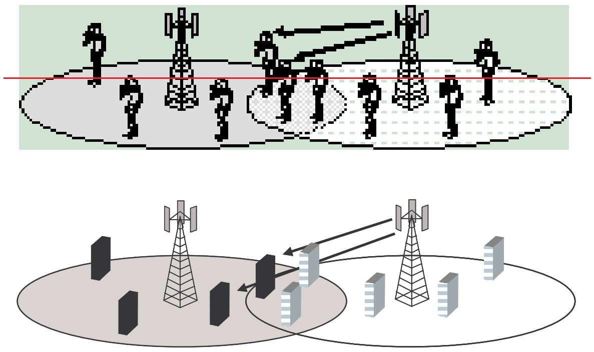


Figure h52—Detection and identification of the SATIs content by the master SSs

During this step (Detection and identification of the SATIs content by the master SSs), the master SSs in the overlapping area between the master cell and their slave cell listen to the different SATIs sequentially. For each slave cell, these master SSs can get the information contained in the SADD message.

2- Relaying of the SATIs content to the master cell by the master SSs

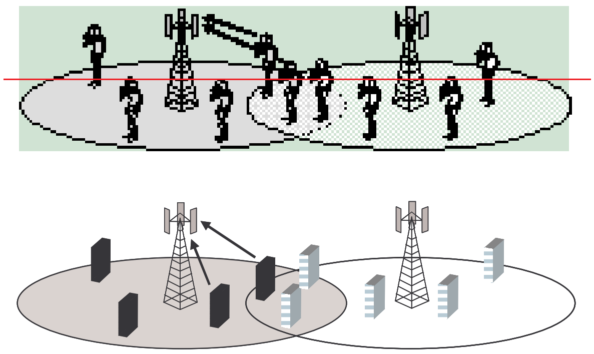
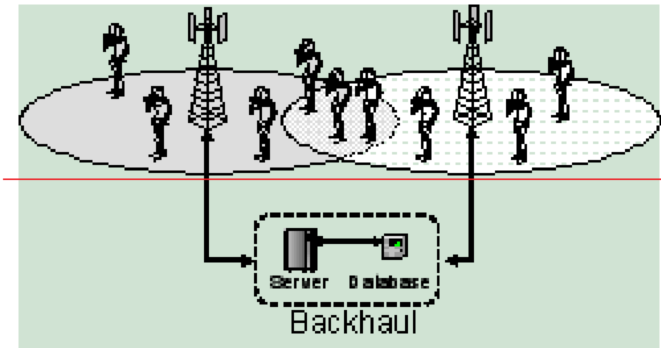


Figure h53—Relaying of the SATIs content to the master cell by the master SSs

- The SADD message information is reported by the master SS to its master cell (Relaying of the SATIs content to the master cell by the master SSs).

- In order to ensure this information is appropriately received by the master BS, the information is sent by several masters (e.g. 2 master SSs convey this information to the master BS in Relaying of the SATIs content to the master cell by the master SSs). This ensures both reliability and security check.

3- Master BS - Slave BS communication through the backhaul



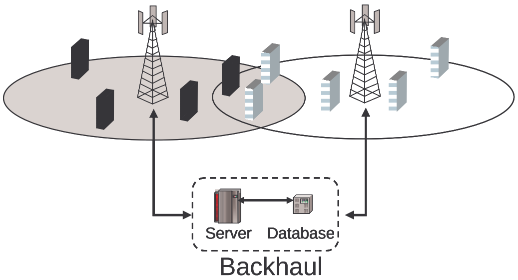


Figure h54—Master BS - Slave BS communication through the backhaul

After step 2, the master BS knows the IP_Proxy_address_S (Section 6.3.2.3.65) of the slave cell. Accordingly, the communications between master and slave cells (BSs) is performed through the backhaul to make the negotiation (Master BS - Slave BS communication through the backhaul) with the co-existence protocol (CP). The remaining phases of the credit tokens based negotiation cycle is performed via this backhaul with IP based communications using a server and database.

Editorial text remedies for sections 15.5.2

Update the text of Table h11 with the amended text below

Table h11—TLV types for CP payload

Type	Parameter Description	Length (bits)	Comment
…			
35	T_{Start} *[Notes:For Credit Token till 49]*	16	In microsecond
36	T_{End}	16	In microsecond
37	$T_{Start\ Renting}$	16	In microsecond
38	$T_{End\ Renting}$	16	In microsecond
39	MRCTN	16	In number of credit token
40	$T_{Start\ Negotiation}$	16	In microsecond
41	$T_{End\ Negotiation}$	16	In microsecond
42	BS_CT	16	In number of credit token
43	~~x~~frac	16	Scalar
44	$T_{Start\ proposal}$	16	In microsecond
45	$T_{End\ proposal}$	16	In microsecond
46	Pmin~~min~~	16	In number of credit token
45	Pmax~~max~~	16	In number of credit token

46	Pr	16	In number of credit token
47	Credit token transaction confirmation	1	
48	Resource usage confirmation	1	
49	Resource usage confirmation notification	1	

Editorial text remedies for sections 15.5.2.38

Update the text of Table h37 with the amended text below

Table h37—Negotiation Process Reply message attributes

Attribute	Contents
BS_CT	Number of credit tokens per time unit
~~X~~frac	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.
$T_{\cancel{END}End\ proposal}$	Ending time from which BS_CT applies for.

Editorial text remedies for sections 15.5.2.39

Update the text of Table h38 with the amended text below

Table h38—Credit Token Proposal Request message attributes

Attribute	Contents
Pmin$^{\cancel{min}}$	Minimal payoff
Pmax$^{\cancel{max}}$	Maximal payoff

References

[1] IEEE 802.16h-06/015r1: Part 16: Air Interface for Fixed Broadband Wireless Access Systems Amendment for Improved Coexistence Mechanisms for License-Exempt Operation, Working document; 2006-08-01

[2] 80216h-06_020r1: Working Group Review Commentary file from session #44.