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Evaluation of Protocol Applied to Network Routing WCETT Cognitive Radio

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***Abstract*—**This article presents the results of researchrelated to the assessment protocol weightedcumulative expected transmission time (WCETT)applied to cognitive radio networks.The development work was based on researchdone by different authors, we simulated a network,which communicates wirelessly, using a licensedchannel, through which other nodes are notlicensed, try to transmit during a given time nodeuntil the station's owner begins its transmission.

***Keywords*—**Cognitive radio, ETT, WCETT

I. Introduction

COGNITIVE ratio networks (CRN) consist of cognitive devices, spectrum agile able to change the settings on the setting on the fly based on the spectrum environment [6].This ability opens the possibility of designing strategies more flexible an dynamic spectrum access to timely reuse of temporarily unoccupied portions of the spectrum licensed to primary users [5].

To find quality of service (QoS) [3] of the transmission needs in wireless mesh networks [4], it remains a significant research challenge, mainly due to performance and average delay. This document focuses on multi-channel technology for multi-radio network and presents an evaluation of the routing metric called: time weighted cumulative expected transmission (WCETT) in cognitive radio networks.

II. Description Of The Protocol Wcett (Cumulative Weigh Ted Expected Transmission Time)

In [1] presents: WCETT that involves assigning weights to each of the links given time in the transmission linked out (ETT).

In WCETT when you have two adjacent nodes, they can use same channel to transmit the same amount of video stream. Therefore, before data transmission, the node must wait for the channel resource is available. This will incur longer delays and lower performance.

WCETT can also be viewed as a routing metric that takes into account two things: the difference in the bandwidth of link and the diversity of channel assignment.

WCETT has the advantage of allowing network nodes to configure the best path within the variety of channels offered and the bandwidth of link IGWs.

WCETT addition takes into account the channels used in the current link and the link above a path.

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When the current link is using the same channel as its previous link, then it is assigned a value of more parameter to the current relationship in order to capture intra-flow interference within each route. For the reason, these can be routed through routers with lower traffic density. The disadvantage of these metrics is that they take into account the load balancing. Also arises that if the best current path is heavily loaded or congested, the node can switch to route the second most efficient way.

WCETT routing metric for a path is estimated by the following equation:

$$CETT = (1-\propto)x \sum_{i=1}^{L} ETT_i + \propto x\ ma \quad (1)$$

Where is that TTE is is the waiting time in the transmission link in a path of length L, α is an adjustable parameter ranging from 0 to 1 and is the sum of transmission times on particular channel j. The value of ETT is taken as ETT = ETX where is the transmission timeout, S denotes the length of the packet and B refers to the bandwidth of the link. The ETX value is obtained using the mechanism of probe packet. The first is the sum of the ETT all the links along the way and delay factor represents the end to end. This factor represents the end to end delay essentially provides the approximate and delay that a particular package deal- The second factor is the diversity of channels that reduce the possibility of a link, using a widely used channel to be included in the road. The value can be obtained as follows:

$$T_j = \forall_{1 \leq j \leq k} \ \ \sum_{Link\ i \in L\ uses\ channel\ j} ETT_i \quad (2)$$

Where that K is the number of channels in the system and L is the length of the road. In general the path bandwidth is higher, limited by the bottleneck link, which has the lowest bandwidth.

The factor of the diversity of channels is reduced to the choice of a path that has bottleneck links. The adjustable parameter α provides a balance that reduces the delay from end to end and the second factor, which reduces the bottleneck links.

II. Description Of The Algorithm Used

Below Fig. 1, one can observe flow chart of the sequence of activities that took place in the process to achieve the simulation

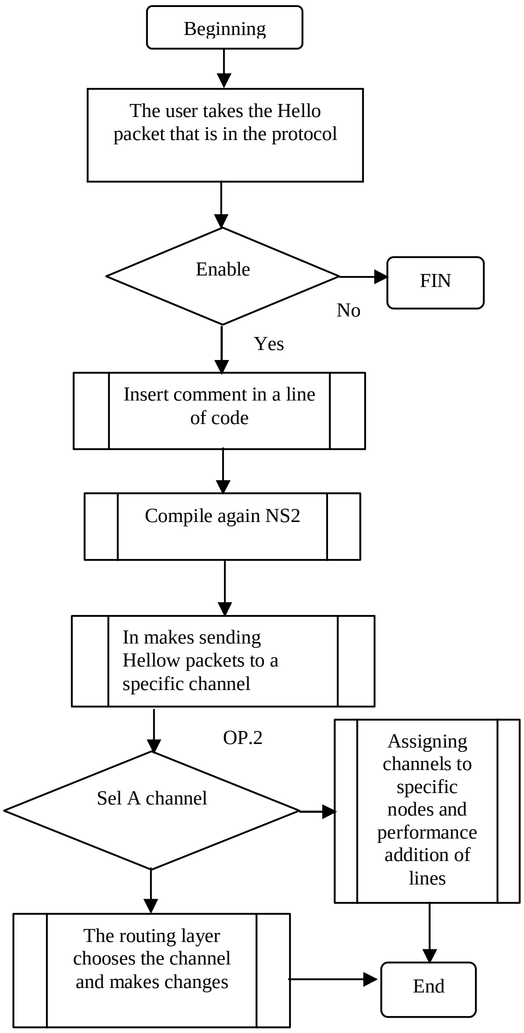

Fig. 1 Flow chart algorithm used

A. Parameter measurement protocol

Parameters taken into account to evaluate the performance of the protocols are:

Average routing load:

$$CPE = ctpc/ts \quad (3)$$

Where CTPC is the local amount of routing control packets and it is the time simulation.

Time average delay:

$$RP = \sum_i tep - trp/tpt \quad (4)$$

Where TEP is the time to send packets, TRP is the time for receipt of packages and TPT is the total transmitted packets, finally it represents the i-th packet.

Throughput:

$$T = tpre/tpe \quad (5)$$

Where TPRE represents total packets received successful and TPE total packets sent.

III. Simulation

Below describes the simulation process carried out development work; including at first a brief description of the simulator used ns-2 [7].

A. Results

The network consist of 10 nodes as shown in table 1, we can see further into it than just the node 8 is the non- licensed the rest.

Communicate using the routing protocol WCETT, all nodes communicate wireless; the other nodes except 8 are trying to use the available channel. As shown in (Table 2) in the instants of time t=10 ms, 15 ms and 20 ms, 1,4 and 9 respectively nodes begin to transmit to node 0, during the simulation, the nodes move and pass through other nodes through the channel of the node degree. At time t=100 ms in Table 2 red we see this node degree (8) it starts to use the channel to transmit to node 0 and then the nodes must stop unlicensed broadcasting, as shown in Fig. 2

TABLE I
Units for Magnetic Properties

Id node	Graduate
0	no
1	no
2	no
3	no
4	no
5	no
6	no
7	no
8	yes
9	no

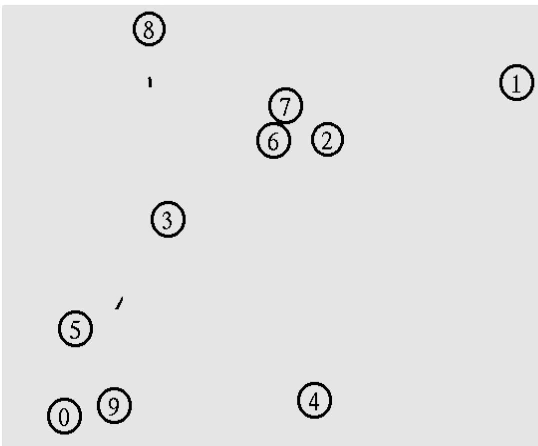

Fig. 2 Scenario of simulation

B. Simulation results

The graphical representation of the results shown in Fig. 3, 4 and 5, according to network topology raised. The average load routing behaves exponentially, but around 300 packets per second behavior is stable so is expected to be normal value for routing protocol WCETT because the proposed scenario does not generate congestion between nodes that are transmitting information. Given the results obtained in [8], we can observe Fig. 3 that the routing load value is relatively high compared with other routing protocols (AODV and DSR).

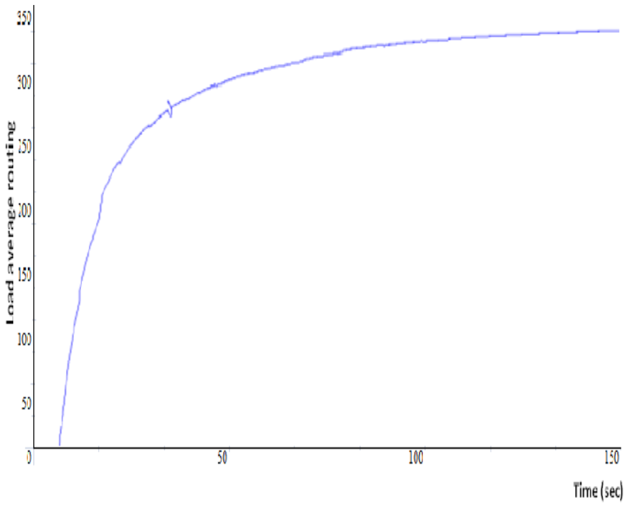

Fig. 3 Average routing load

As shown in Fig. 4, the average delay has a peak at the beginning of logic simulation, but their behavior over the same is relatively stable, after only 100 miliseconds, which is the instant exact time when the node 8 starts to transmit information through licensed channels, canceling the transmission of nodes 1, 4 and 9, between the time instants 0 and 100 ms delay behavior is shaped to some extent by oscillatory simultaneously the amount of information being transmittied through the channel (nodes 1, 4 and 9 to send information to node 0)

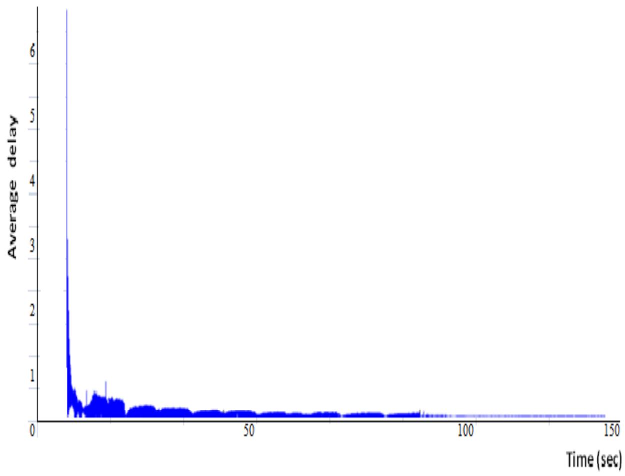

Fig. 4 Average delay

Throughput (Fig. 5) to archieve an effective close 100% in most of the simulation, obtaining remained constant from 50 ms, so it follows that at this moment in time stabilized nodes update their routing tables, which can also be seen in Fig. 4 whre there is stabilization of the average load in the same instant of time

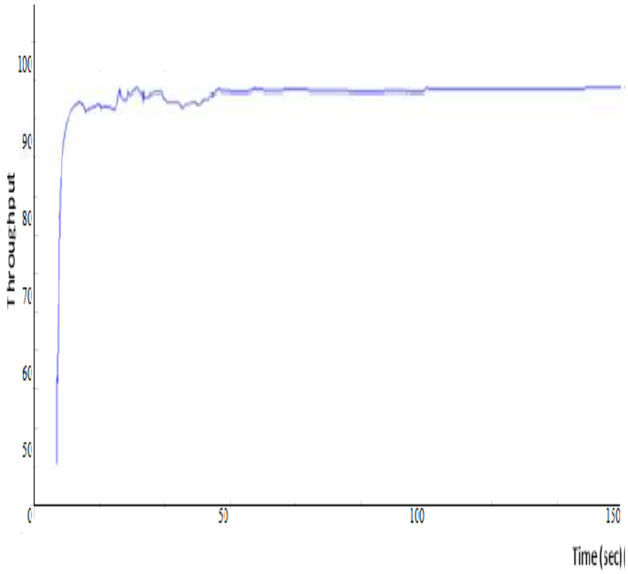

Fig. 5 Througput

IV. CONCLUSIONS

The routing protocol behavior WCETT, as expected according to the requirements that demand the implementation of cognitive radio, as the throughput remains almost 100% throughput the simulation.

Although the average routing load has a relatively high value compared with other protocols, this is compensated with low delay values for which, WCETT is a protocol suitable for use in cognitive radio, given the need that exists in such networks channel allocation to the licensed user almost immediately when required.

It is an open situation on its efficient in a hostile arena, given the scenario present does not represent a greater demand for the protocol due to the limited number of simultaneous transmissions and thus the lack of network congestion.

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