OBTAINING THE EFFECTS OF WMM IN CONGESTED 802.11 NETWORKS

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International Scientific Conference
Gabrovo/Bulgaria 20-21 November 2009

Agenda

- Introduction
- IEEE 802.11 DCF
- IEEE 802.11e EDCF
- WMM
- Tests
- Results

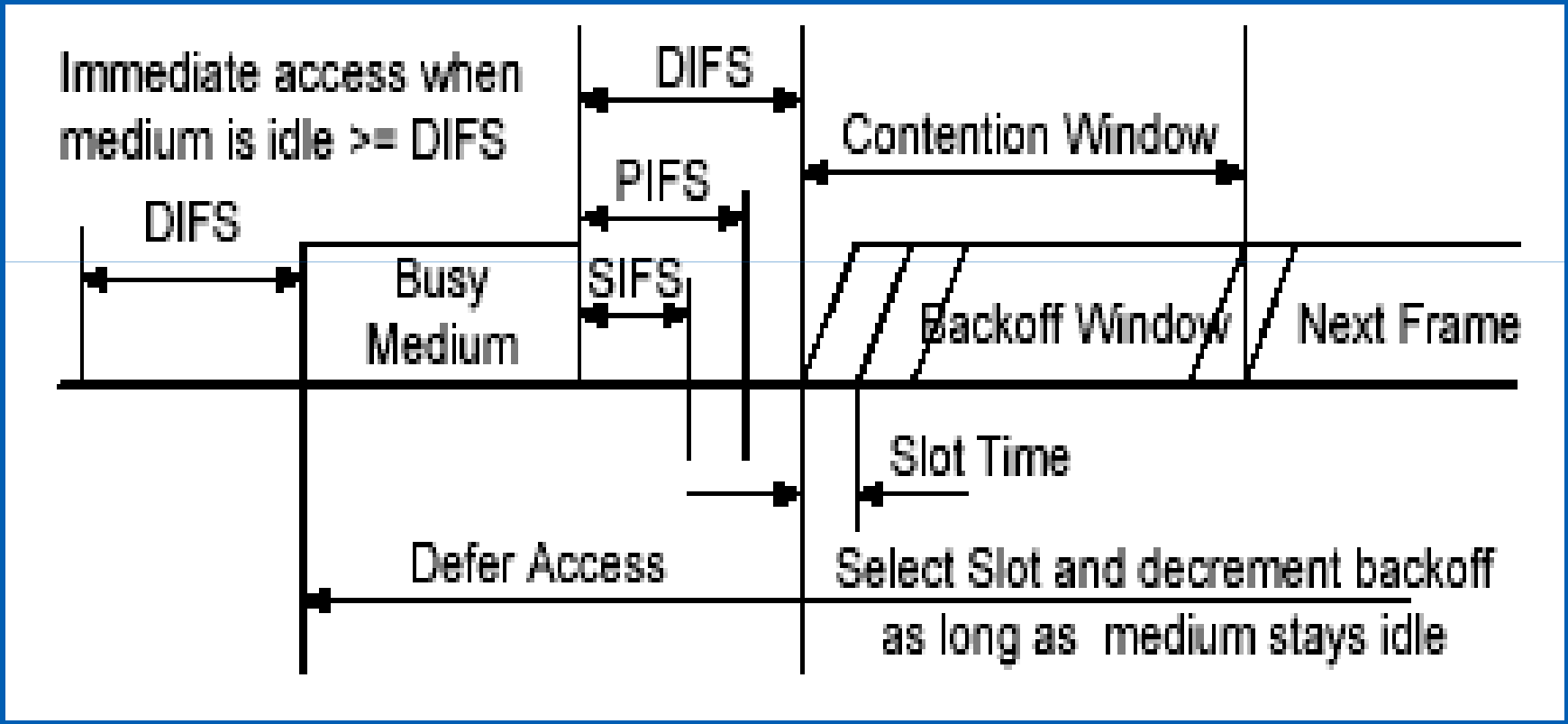
Introduction

- IEEE 802.11 is the standard for wireless local area networks.
- IEEE 802.11e is the standard developed for implementing quality of service.
- IEEE 802.11e can be a solution for delay sensitive applications such as voice and video.

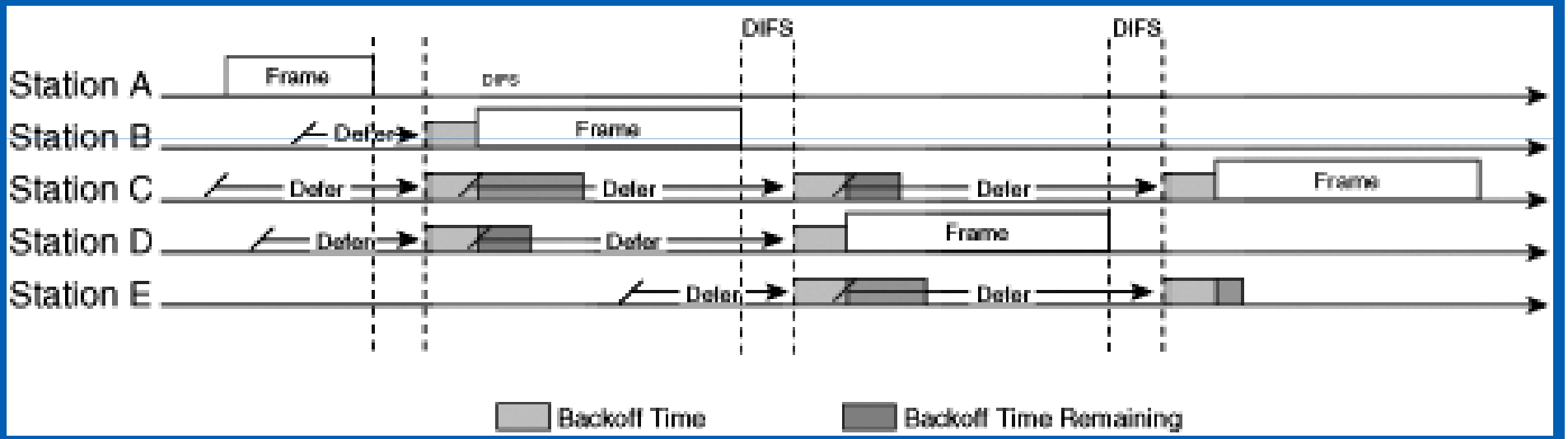
IEEE 802.11 DCF

- 802.11 DCF (distributed coordination function) uses Carrier Sense Multiple Access with Collision Avoidance algorithm.(CSMA/CA).
- This algorithm uses a random backoff timer for transmission and stations transmit their frames according to these values.

IEEE 802.11 DCF



IEEE 802.11 DCF



IEEE 802.11e EDCF

- 802.11 standard does not contain specifications for prioritization of frames.
- Basically DCF is designed for collision avoidance.
- EDCF is dependent to DCF.

IEEE 802.11e EDCF

- EDCF still uses random backoff timers.
- EDCF mechanism defines four access categories for transmission of frames which allows prioritization.
- EDCF offers different random backoff timers according to access categories.

IEEE 802.11e EDCF

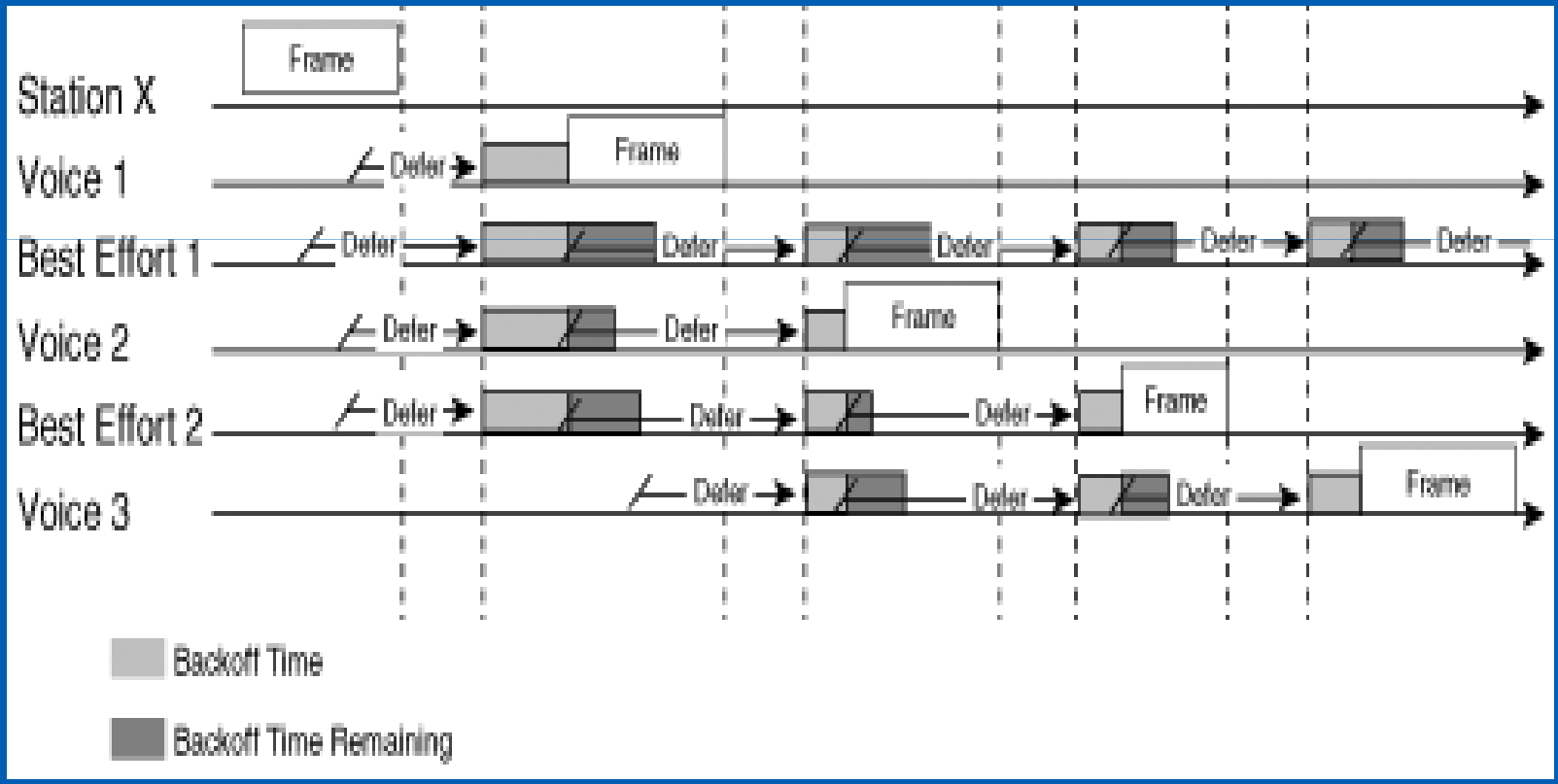
PRIORITY TO ACCESS CATEGORY MAPPINGS

Priority	Access Category (AC)	Designation (Informative)
1	0	Best Effort
2	0	Best Effort
0	0	Best Effort
3	1	Video Probe
4	2	Video
5	2	Video
6	3	Voice
7	3	Voice

EDCF Variables

Priority	Access Categories	Definitions	CWMin	CWMax	AIFS[s]
1	0	Best Effort	15	1023	72 µs
2	0	Best Effort			
0	0	Best Effort			
3	1	Video Probe	15	1023	37 µs
4	2	Video	7	15	28 µs
5	2	Video			
6	3	Voice	3	7	28 µs
7	3	Voice			

IEEE 802.11e EDCF



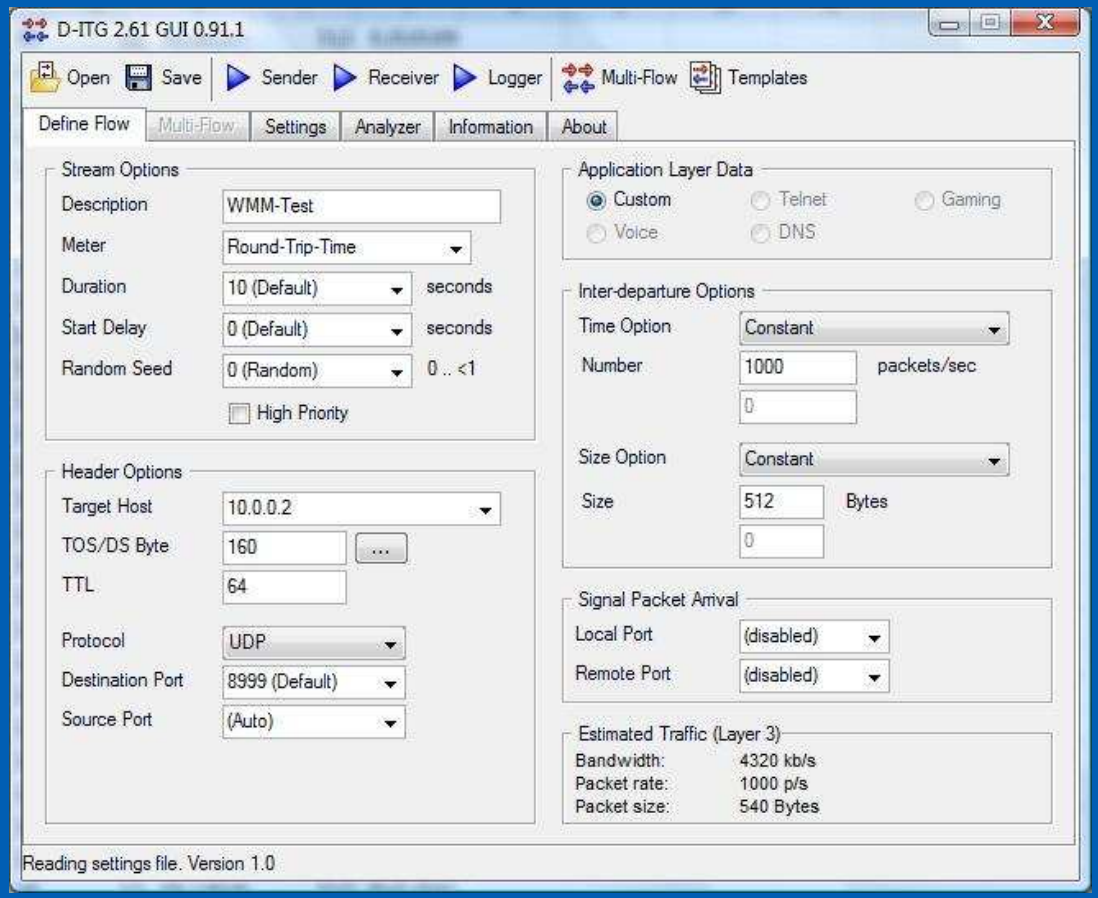
WMM

- WMM has been developed by Wi-Fi organization to standardize the QoS in wireless networks.
- WMM provides standardization of QoS implementations from different device vendors.

Testing Tool

- D-ITG (Distributed Internet Traffic Generator) was used as testing tool.
- Various types of data communications can be simulated and many measurements can be made by this open source software.

D-ITG GUI



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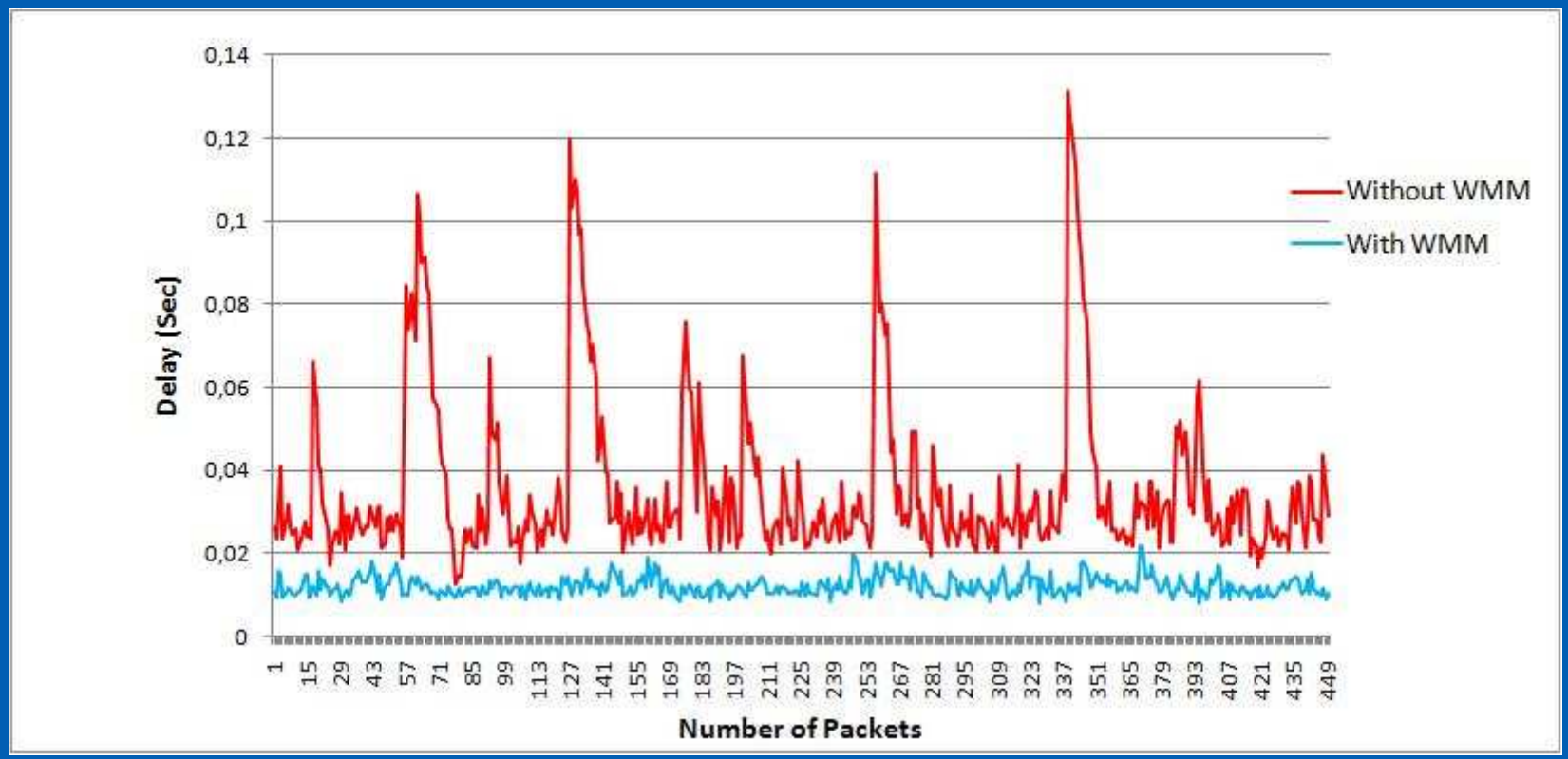
Test Variables

- UDP traffic patterns' IP precedence (ToS) values have been set to 5.
- The payload size was 512 bytes.
- Tested under congested network circumstances with and without WMM applied.

Delay rates with and without WMM



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Results

- Delay and jitter problems of sensitive traffic in congested networks are decreased by 802.11e and WMM.
- But It's not clear if most of the users have special priority.
- Under normal conditions, wireless networks are approached to a better level with EDCF.

THANK YOU

You can find this presentation at
http://www2.itu.edu.tr/~akingok

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