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Wireless LANs

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| VoIP Traffic Model Content for 11ax TG Simulation Scenarios and EvaluationMethodology |
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# Abstract

This document provides traffic model content edits to Appendix 2 of the draft Evaluation Methodology document IEEE 802.11-14/0571r2 and Annex 1 of the draft Simulations Scenario document IEEE 802.11-14/1621r4

# Problem 1

Annex 1 of the draft Simulations Scenario document IEEE 802.11-14/1621r4 is missing content for the VoIP traffic model, used in scenario 1~4.

# Remedy 1

[Insert row data into the tables in Annex 1 of the draft Simulations Scenario document IEEE 802.11-14/1621r4 as:]

# Annex 1 - Reference traffic profiles per scenario

**Reference traffic profile for Scenario 1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Traffic Model #**  | **Traffic model name**  | **Description**  | **Application traffic** **(Forward / Backward)**  |  **Application Load (Mbps)** **(Forward / Backward)**  | **A-MPDU Size (B)** **(Forward / Backward)**  |
| T1  | Local file transfer  | FTP/TCP transfer of large file within local network  | FTP file transfer / FTP TCP ACK  | Full buffer / 0.1  | Max A-MPDU / 64  |
| T2 | Lightly compressed video |  |  |  |  |
| T3 | Internet streaming video/audio |  |  |  |  |
| T4 | 4k video streaming |  |  |  |  |
| T5 | Online game server |  |  |  |  |
| T6 | Management: Beacon  |  |  |  |  |
| T7 | Management: Probe requests |  |  |  |  |
| T8 | Gaming |  |  |  |  |
| T9 | VoIP |  |  |  |  |

**Reference traffic profile for Scenario 2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Traffic Model #**  | **Traffic model name**  | **Description**  | **Application traffic** **(Forward / Backward)**  |  **Application Load (Mbps)** **(Forward / Backward)**  | **A-MPDU Size (B)** **(Forward / Backward)**  |
| T1  | Local file transfer  | FTP/TCP transfer of large file within local network  | FTP file transfer / FTP TCP ACK  | Full buffer / 0.1  | Max A-MPDU / 64  |
| T2 | Lightly compressed video |  |  |  |  |
| T3 | Internet streaming video/audio |  |  |  |  |
| T4 | 4k video streaming |  |  |  |  |
| T5 | Online game server |  |  |  |  |
| T6 | Management: Beacon  |  |  |  |  |
| T7 | Management: Probe requests |  |  |  |  |
| T8 | Virtual desktop infrastructure |  |  |  |  |
| T9 | VoIP |  |  |  |  |

**Reference traffic profile for Scenario 3**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Traffic Model #**  | **Traffic model name**  | **Description**  | **Application traffic** **(Forward / Backward)**  |  **Application Load (Mbps)** **(Forward / Backward)**  | **A-MPDU Size (B)** **(Forward / Backward)**  |
| T1  | Local file transfer  | FTP/TCP transfer of large file within local network  | FTP file transfer / FTP TCP ACK  | Full buffer / 0.1  | Max A-MPDU / 64  |
| T2 | Lightly compressed video |  |  |  |  |
| T3 | Internet streaming video/audio |  |  |  |  |
| T4 | 4k video streaming |  |  |  |  |
| T5 | Online game server |  |  |  |  |
| T6 | Management: Beacon  |  |  |  |  |
| T7 | Management: Probe requests |  |  |  |  |
| T8 | Multicast Video Streaming | UDP/IP transfer of compressed video streaming | UDP packet transfer/Nothing | 3-6Mbps/Nothing |  |
| T9 | Gaming |  |  |  |  |
| T10 | VoIP |  |  |  |  |

**Reference traffic profile for Scenario 4**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Traffic Model #**  | **Traffic model name**  | **Description**  | **Application traffic** **(Forward / Backward)**  |  **Application Load (Mbps)** **(Forward / Backward)**  | **A-MPDU Size (B)** **(Forward / Backward)**  |
| T1  | Local file transfer  | FTP/TCP transfer of large file within local network  | FTP file transfer / FTP TCP ACK  | Full buffer / 0.1  | Max A-MPDU / 64  |
| T2 | Lightly compressed video |  |  |  |  |
| T3 | Internet streaming video/audio |  |  |  |  |
| T4 | 4k video streaming |  |  |  |  |
| T5 | Online game server |  |  |  |  |
| T6 | Management: Beacon  |  |  |  |  |
| T7 | Management: Probe requests |  |  |  |  |
| T8 | VoIP |  |  |  |  |

# Problem 2

Appendix 2 of the draft Evaluation Methodology document IEEE 802.11-14/0571r2 is missing contents for the VoIP traffic model, used in scenarios 1~4.

# Remedy 2

[Insert text to the end of Appendix 2 of the draft Evaluation Methodology document IEEE 802.11-14/0571r2 as:]

# Appendix 2 – Traffic model descriptions

**VoIP Traffic Model**

VoIP service uses the internet protocols to delivery real-time voice packets across networks. The VoIP traffic comprises periods of active talking and silence, as shown in Figure 1. It can be considered as a simple 2-state noice activity Markov model as shown in Figure 2.



**Figure 1: VoIP traffic profile**



**Figure 2: Two-state voice activeity model**

For VoIP traffic, the VoIP user will always be in either the silence state (State 0) or active talking state (State 1), assuming that the probability of transitioning from state 0 to state 1 is *a*, and the reciprocal transition from state 1 to state 0 is *b*. Hence, the probability of staying in state 0 is 1*-a* and in state 1 is 1-*b*. The state update is assumed to be done at the speech encoder frame rate *R*=1/*T*, where *T* is the encoder frame duration whose typical value is 20ms for active talking state and 160ms for silence state, respectively. VoIP packets are generated at time intervals *iT*+*τ*, where *τ* is the network packet arrival delay jitter, and *i* is the encoder frame index. During the active state, voice packets with fixed size are generated at these time intervals, while the model is updated at regular frame intervals [1].

The detailed prarameters of the VoIP traffic model are specified in Table 1. The rate of voice source assumes 12.2 kbps with a 50% voice acitivity factor. The payload size of active talking state and silence state are 33 byte and 7 byte respectively. Compressed protocol headers including UDP check sum are used in the traffic, which is 3 byte for IPv4 and 5 byte for IPv6. The total voice MSDU frame sizes for active talking state are 36 byte and 38 byte for IPv4 and IPv6 respectively, and for silence state are 10 byte and 12 byte for IPv4 and IPv6 respectively.

Table 1: Parameters for VoIP traffic model

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Distribution** | **Parameters**  | **PDF** |
| Source rate | N/A | 12.2 Kbps | N/A |
| Active packet payload size | N/A | 33 byte | N/A |
| Silence packet payload size | N/A | 7 byte | N/A |
| Compressed protocol headers | N/A | IPv4: 3 byteIPv6: 5 byte | N/A |
| Voice encoder interval | N/A | 20+τ ms | N/A |
| Noise encoder interval | N/A | 160+τ ms | N/A |
| Active/Silence state duration | Exponential | Mean=1.25 second |  |
| Downlink delay jitter | Laplacian | *β*=5.11 ms |  |
| Uplink delay jitter | N/A | 0 | N/A |
| Voice activity factor | N/A |  | N/A |
| a | N/A | 0.016 | N/A |
| b | N/A | 0.016 | N/A |

 **Evaluation metrics**

MAC throughput, latency

**References for VoIP traffic models**

**[1] IEEE 802.16m-08/004r5, IEEE 802.16m Evaluation Methodology Document (EMD)**