IEEE P802.11  
Wireless LANs

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| Functional Requirements Document for 11aj | | | | |
| Date: 2013-01-22 | | | | |
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Abstract

This document describes the functional and system performance requirements for TGaj. The functional requirements must be addressed by the amendment.

# Contributors

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# Revision History

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| **Revision** | **Comments** | **Date** |
| R0 | Initial draft | 2012-11-12 |
| R1 | Remove channelization solution as requested in Nov meeting and correct some typos. | 2012-11-14 |
| R2 | Add [Req2.5.3] | 2013-01-22 |
| R3 | Clarify the phrase “The TGaj amendment is required to” and correct some typos | 2013-04-24 |
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# Overview

This document includes functional requirements that address PAR requirements and additional system performance metrics. The PAR requirements include maximum throughput, channelization in Chinese 59-64 GHz and 45 GHz frequency band, backward compatibility with 802.11ad in 59-64 GHz frequency band, 802.11 user experience. Additional performance metrics include requirements for uncompressed video and range. Functional requirements are identified by the notation [Req{SectionCode}.X].

The phrase “The TGaj amendment provides a means” indicates that at least an optional feature must be incorporated into the TGaj amendment addressing this requirement.

The phrase “All devices are required to support” indicates that a mandatory feature must be incorporated into the TGaj amendment addressing this requirement.

The phrase “The TGaj amendment is required to” indicates that a mandatory feature must be incorporated into the TGaj amendment addressing this requirement.

# Functional Requirements

## System Performance

### Maximum throughput

[Req2.1.1.1] The TGaj amendment provides a means of achieving a maximum throughput of at least 1 Gbps, as measured at the MAC data service access point (SAP).

[Req2.1.1.2] All devices are required to support a mode that achieves a maximum PHY rate of at least 1 Gbps.

### Range

[Req2.1.2.1] The TGaj amendment provides a means of achieving a range of at least TBD m at 1 Gbps when it operates in the Chinese 59-64 GHz band, as measured at the MAC data SAP, in some NLOS PHY channel conditions.

[Req 2.1.2.2] The TGaj amendment also provides a means of achieving a range of at least TBD m at 1 Gbps when it operates in the Chinese 45 GHz band, as measured at the MAC data SAP, in some NLOS PHY channel conditions.

These NLOS PHY channel conditions are defined by evaluation methodology document.

### Video Requirements

The TGaj amendment provides a means of supporting uncompressed video requirements for rate, packet loss rate and delay, as measured at the MAC data SAP.

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| Req number | Parameter | Value | Description |
| Req2.1.3.1 | Rate | 3 Gbps | Uncompressed video, 1080p  (RGB): 1920x1080 pixels, 24bits/pixels,60frames/s |
| Req2.1.3.2 | Packet loss rate (8Kbyte payload) | 1e-8 |
| Req2.1.3.3 | Delay | 10 ms |

## Channelization

The 60 GHz frequency band allocated in China only has a bandwidth of 5 GHz (59-64 GHz) which gives only 2 logical channels for networking when operating in China. This may limit the usage of 802.11ad products in the China market. Therefore, the TGaj amendment is required to provide a means of supporting at least 3 logical channels for more convenient usage of 802.11aj products in China market.

The TGaj amendment enables larger coverage area and portable devices with lower-power supporting more application scenarios than 802.11ad with 45 GHz frequency band support. Therefore, the TGaj amendment is also required to define channelization scheme for Chinese 45 GHz frequency band for usage of 802.11aj products in China market.

[Req2.2.1] The system is required to support at least 3 logical channels when it operates in Chinese 59-64 GHz frequency band.

[Req2.2.2] The TGaj amendment is also required to define channelization scheme for Chinese 45 GHz frequency band.

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## Fast session transfer

Fast Session Transfer provides a seamless transfer of an active session from the 60/45 GHz band to the 2.4/5 GHz band, or vice versa, with no interruption of the session when the previous frequency band links are not operational for some reason. This does not imply that devices must be multi-band.

[Req2.3.1] The TGaj amendment provides a means of fast session transfer between 60 GHz and 2.4/5 GHz PHYs.

[Req2.3.2] The TGaj amendment provides a means of fast session transfer between 45 GHz and 2.4/5 GHz PHYs.

## Backward compatibility with 802.11ad

The TGaj amendment defines modifications to the IEEE P802.11ad Physical (PHY) layer and the Medium Access Control (MAC) layer to enable operation in the Chinese 59-64 GHz frequency band. The amendment shall maintain backward compatibility with 802.11ad when it operates in the Chinese 59-64 GHz frequency band. This requirement insures that 802.11ad and 802.11aj products are interoperable in China market.

[Req2.4.1] The TGaj amendment is required to maintain backward compatibility with 802.11ad on 60 GHz frequency band.

## 802.11 user experience

As an amendment to 802.11, the TGaj amendment must maintain the network architecture of the 802.11 system, e.g. infrastructure basic service set, extended service set, access point, and station. Furthermore the system must maintain backward compatibility to 802.11 management plane, e.g. association, authentication, security, measurement, capability exchange, and MIB.

[Req2.5.1] The TGaj amendment is required to maintain the network architecture of the 802.11 system.

[Req2.5.2]The TGaj amendment is required to maintain backward compatibility to 802.11 management plane.

[Req2.5.3] The TGaj amendment provides a means of enhanced robust transmission for mobile devices with small size antenna.

# Specification Requirements

## PICS

[Req3.1.1] The TGaj amendment will include a PICS proforma.

# References

This document utilizes the template in the IEEE 802.11ad Functional Requirement document, 11-09-0228r05. Other references include:

1. 11-12-0140-09-cmmw-ieee-802-11-cmmw-sg-par.doc
2. 11-12-0141-07-cmmw-ieee-802-11-cmww-sg-5c.doc
3. 11-08-0806-07-0vht-60-ghz-par-nescom-form-plus-5Cs.doc
4. *TGaj evaluation methodology document*