Liaison statement from Wi-Fi Alliance on Non-OFDM Use Cases

Date: **2014-07-15**

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Introduction

A liaison statement was received from Ian Sherlock, Chair of the Wi-Fi Alliance™, in response to a liaison request from 802.11 (11-14/182r2) sent on 2014-02-11.

Attached on the following pages is the liaison document. As the liaison is copyright by the Wi-Fi Alliance, a copyright permission letter is prefixed.

This meets the IEEE-SA requirements and enables the response to be posted on the 802.11 document server.

R1: Embedding the documents was problematical So posted as a pdf file.

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July 15, 2014

Adrian Stephens Chair, IEEE
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Dear Adrian,

I am authorized to grant permission to use the material in connection with the IEEE Project noted below, including public review of the material.

Project: P802.11 Revision mc

Wi-Fi Alliance document submitted to IEEE: "Wi-Fi-NOL-Liaison letter v4.pdf"

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President & CEO, Wi-Fi Alliance

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None

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Liaison Transmittance of Information
Name of External Organization: IEEE 802.11 Working Group
Date: 15 July 2014
Title(s) of Document(s) Sent: Wi-Fi-NOL-Liaison letter v4.pdf
Source Group within the Wi-Fi Alliance: Non-OFDM Liaison Marketing Task Group
Requested Action(s): Review response documents provided. No further action required unless the IEEE 802.11 Working Group would like to request additional information from Wi-Fi Alliance.

Liaison of Non-OFDM Use Cases from Wi-Fi Alliance® to IEEE 802.11 Working Group

Version 4.0

3 July 2014

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Dr. Adrian Stephens
Chair, IEEE 802.11 Working Group

Dear Dr. Stephens:

The IEEE 802.11 Working Group sent Wi-Fi Alliance a liaison on 11 February 2014 (IEEE 802.11 document 11-14-0182r2) requesting input from Wi-Fi Alliance on questions related to the use of non-OFDM rates (1/2/5.5/11 Mb/s). In particular, the IEEE 802.11 Working Group asked for input on:

- Current and likely future use cases and market requirements for non-OFDM rates
- Potential solution mechanisms (including changes to the IEEE 802.11 Standard and/or usage policy/configuration recommendations) to discourage the use of non-OFDM rates

Wi-Fi Alliance subsequently formed the Non-OFDM Liaison Marketing Task Group to consider in detail these requests from the IEEE 802.11 Working Group.

Wi-Fi Alliance has identified a set of use cases, which are described in the second part of this liaison document. Please note that the use cases provided are not necessarily comprehensive. In addition, Wi-Fi Alliance does not have agreement among its membership on how common the use cases will be in the market or how necessary non-OFDM rates are to satisfy them.

Some Wi-Fi Alliance members believe that support for non-OFDM rates is particularly important in clients that want to maximize range, and possibly those that want to minimize power consumption, but do not have a requirement for high data rates or bulk data. These attributes may, for example, characterize some devices in the IoT market segment. The IoT market segment, while currently small, is potentially very large and is of significant interest to Wi-Fi Alliance. It is the view of some Wi-Fi Alliance members that some IoT clients will not support any OFDM rates.

The Non-OFDM Liaison Marketing Task Group has not yet completed its discussions in relation to potential solution mechanisms to discourage the use of non-OFDM rates, and so it is unable to provide any input on this topic to the IEEE 802.11 Working Group by the requested date of 14 July 2014. However, at this time the Task Group has not yet concluded its operation. If a recommendation is agreed the Task Group will provide it to the IEEE 802.11 Working Group in time for the Working Group's September 2014 meeting.

Please feel free to contact Wi-Fi Alliance through me with any questions or comments related to this liaison document.

Yours sincerely,

Ian Sherlock
Chair of Wi-Fi Alliance

Non-OFDM use case summary

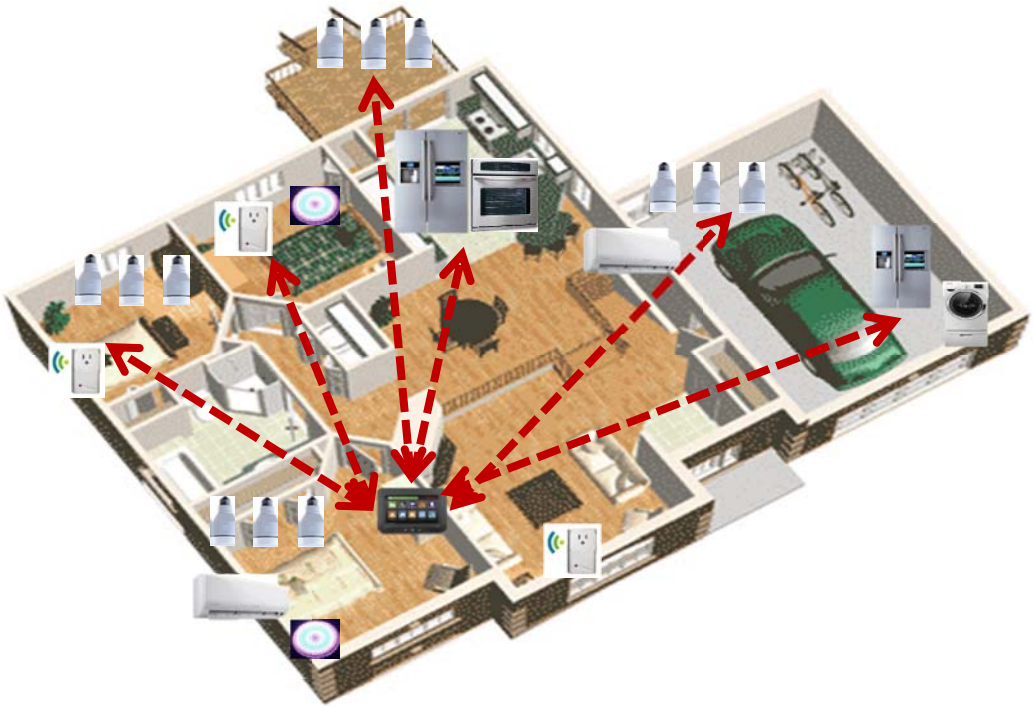
1 Smart Home Use Case

1.1 Description

Alice lives in a two-story, three-bedroom home. She has an operational WLAN that includes a connected (wireless) TV, a wireless DVR, a laptop, and an access point located in the same room as the television.

Alice wishes to extend her WLAN's capabilities to include access to various household appliances, such as dishwasher, washing and drying machines, alarm clock, LED lamps, smart power plugs, and wireless surveillance cameras for home security. These devices will be placed throughout the house, including several locations that are several rooms away from the access point. The distance between corners of the home is about 30m with as many as 8 walls (and one floor) between the access point and an appliance.

Alice wishes to be able to connect each new wirelessly-enabled appliance to the existing access point, without having to move the access point. The operation of her existing network must experience no perceptible degradation.



1.1 Specifications

1.1.1 Data rates

The devices require very low data rates; the key issues are range and interoperability. For maximum range, the wirelessly-enabled appliances should include the 1 Mbps DSSS data rate.

Because the newly added wireless smart home devices will operate in a mixed environment with many other appliances, and because the use case requires no perceptible negative impact on the operation of the pre-existing WLAN, the appliances should include the 2 Mbps DSSS rate and the 6 Mbps OFDM rate at a minimum. More generally, the appliances will use 6 Mbps or higher data rates where possible.

Required data rates (Mbps): 1, 2 (non-OFDM), 6 (OFDM)

1.1.2 Traffic characteristics

Much of the traffic, for example most or all machine-machine communication, will tolerate relatively high latency.

Some traffic, for example command to switch on LED lamp, will require medium latency, no more than will be human-perceptible: a fraction of a second.

No traffic to and from the appliances will be required to support low latency.

Required latencies: medium to high.

1.1.3 Other characteristics

To provide no perceptible negative impact on the operation of the pre-existing WLAN, the access point must be configured so that protection mechanisms are not usually required for OFDM transmissions.

2 Camera Remote Control Use Case

2.1 Description

Carol is an amateur photographer who owns a wireless-enabled high-resolution digital camera. She would like to be able to transmit photographs to a smartphone or smartphones, and to be able to control her camera remotely from another camera. These features will increase ease of use for many desirable applications, such as group photos containing the photographer (using remote control), and sharing of multiple photos, such as taken at a wedding or child's birthday party, among a group (using transmission of photos to smartphones).

In addition Carol is interested in birdwatching and other nature photography. To capture high quality photographs the camera must be close to the nest; however Carol's presence at such proximity would disturb the birds. Therefore Carol would like to place the camera and to control it from distance.

2.2 Specifications

2.2.1 Data rates

For the remote control function, only very low data rates are required, and 1 Mbps is adequate. The remote control function is useful up to a range of 150 m outdoors, requiring use of the 1 Mbps data rate. The sharing function requires higher data rates (the higher the better), but moderate ranges (up to 10m).

2.2.2 Traffic characteristics

Low latency may be required for the remote control function, but the required data rates are also very low. Sharing of photos will tolerate high latency.

2.2.3 Other characteristics

There are no other critical characteristics

3 Smart Metering Use Case

3.1 Description

Desert Springs Water, a municipal water agency, has spent the last five years implementing a smart metering program. As part of a leak abatement program, Desert Springs Water will hire summer interns who will carry tablet computers running a newly developed leak finder application. The tablets will read meters via Wi-Fi® and access historical data via a cellular connection, searching for unusual usage patterns.

Only very low peak data rates are required in this application, and in addition the duty cycle is very low. Meters may be placed in inaccessible places, such as curbside underground utility enclosures, with intermediate walls and other structures, and the use case requires robust communication at these rates. Continuous association with an access point is not required.

The tablet computers will undergo some degree of (minor) customization by the utility, and are not pure off-the-shelf devices. However the constituent components will be broadly available mass market devices.

There is a significant installed base of Wi-Fi CERTIFIED™ b devices at the meter.

A key factor for Desert Springs Water in this use case is the battery life at the meter.

3.2 Specifications

3.2.1 Data rates

The application achieves all its data communications requirements with 1 Mbps DSSS.

Extra modes to provide compatibility with overlapping Wi-Fi networks are not necessary because of the very low duty cycle.

To be able to communicate with the installed base of Wi-Fi CERTIFIED b devices, tablets need to support at least the 1 Mbps DSSS data rate.

Required rates (Mbps, meter): Any.

Required rates (Mbps, tablet): 1 Mbps.

3.2.2 Traffic characteristics

The smart meters and tablets exchange small amounts of alphanumeric text. The exchanges have no extra latency requirements.

3.2.3 Other characteristics

Because the tablet computers undergo some degree of customization by the utility company, it is not required for this use case that all tablet computers need to support 1 Mbps DSSS, but it is necessary that there should be broad support of 1

Mbps DSSS among tablets. The utility company can be assumed capable of making feature-based distinctions among available mass market tablets, but it is infeasible for the utility company to develop its own hardware.

4 Traveling Salesperson Use Case

4.1 Description

Emily, a health conscious recent college graduate, has just accepted a new sales job. The company has issued her a car, a portable AP and a laptop. Company policy is to tether the laptop to the Internet via the portable AP rather than pay for daily hotel Internet connections. Company policy also allows for reasonable personal use of the cellular data service, which Emily plans to use for her cloud-connected glucose meter, as she will be on the road 75% of the time.

At each new location, Emily switches on her glucose meter. She wishes the glucose meter to be able to connect to her portable AP automatically. To avoid running down the battery unnecessarily, the glucose meter automatically turns off when not in use.

The glucose meter will primarily be used at home, and the primary factor for Emily is range. Range should be sufficient for whole-home coverage.

4.2 Specifications

4.2.1 Data rates

The application needs only a very low peak data rate, with a very low duty cycle: the 1 Mbps data rate is easily sufficient. Power consumption is not a relevant factor. When Emily is on the road, range is not a factor. Range is the primary factor while Emily is at home.

Emily's glucose meter needs to include the 1 and 2 Mbps DSSS data rates at least. If Emily's glucose meter is a Wi-Fi CERTIFIED b device that supports no other PHY data rates, the portable AP needs to support at least one of these data rates.

Required rates

(Mbps; for portable AP, if glucose meter does not include 6 Mbps data rate): 1, 2 (DSSS).

(Mbps; for glucose meter): 1, 2 (DSSS); if a portable AP does not include non-OFDM data rates, 6 Mbps;

4.2.2 Traffic characteristics

There are no latency requirements for the traffic in this use case.

4.2.3 Other characteristics

The glucose meter does not need to maintain open-ended association with the portable AP.

5 Wi-Fi Home Security Door and Window Sensors Use Case

5.1 Description

Fabrizio wishes to install a secure and inexpensive home security system. He wishes to place sensors at each window and door. The sensors will communicate with a centrally placed security control system through Fabrizio's home Wi-Fi AP: the security control system itself will not have AP functionality and will not communicate directly with the sensors.

Sensors will send very little data: either they will communicate with the AP only when an alarm is triggered, or (to counter denial-of-service attacks) they will send periodic packets to the minimum extent needed to indicate that the sensor is operational and that the alarm should not be triggered.

The range must be sufficient to cover the whole house, including attached garage. Because there are many sensors (up to several dozen), the battery requirement at each individual sensor is a critical factor: for a competitive solution the sensors should require the smallest available battery size and must support long battery life.

5.2 Specifications

5.2.1 Data rates

The data requirements are minimal. 1 Mbps is more than enough.

The sensors will remain continuously associated with the home AP and thus will operate in a mixed-mode network. However because the battery life is an overriding design consideration, it will improve the performance of the system significantly if the sensors are not required to listen for any preamble types other than the bare minimum necessary for the application. That is, because the data transfer requirements are so low, the determining factor for overall battery life may be the total power expended in processing preambles (irrespective of the relative requirements for different types of preambles).

In addition, use of coin cell batteries is desirable and these are (arguably, at present) more compatible with DSSS data modes than with OFDM modes.

Required data rates (Mbps): 1 (DSSS)

5.2.2 Traffic characteristics

The traffic consists of short data transfers at low duty cycles (on the order of 0-10 transfers per day) with a high tolerance for latency.

Required latencies: no specific latency requirements

5.2.3 Other characteristics

There may be 25 to 50 sensors in a home including some in the garage, basement and second floor.