

Wireless LANs Brick V2.0

Status of this Memo

This document proposes an update to a standard for the National Institutes of Health (NIH) and requests discussion and suggestions for improvements. Distribution of this memo is unlimited.

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1 Introduction

This document updates the NIH Technical Architecture Standard for [Wireless Local Area Network](#) (WLAN) Infrastructure for the NIH community.

2 Description

A WLAN extends network coverage by providing a wireless (radio) connection between a wireless client (e.g., laptops, Aircard, PDAs, etc) and the network (e.g., NIHnet). Data is transmitted from the client's wireless adapter to an access point (AP) that serves as the bridge to the physical network. WLAN technologies adhere to and operate in accordance with the [IEEE 802.11](#) group of standards.

There are four main physical-layer 802.11 standard specifications for WLANs: 802.11, 802.11b, 802.11a, 802.11g, and 802.11n. The 802.11 is the first standard and is only found in legacy installations. It is discussed here for reference purposes and technologies limited to this standard should not be purchased. The 802.11b reached dominance in late 2003 and has an 11Mbps maximum data rate in the 2.4GHz band. The 802.11a is the follow-up standard that is capable of reaching LAN speeds up to 54Mbps rates in the 5GHz range. The 802.11g standard, increases data rates to 54Mbps in the 2.4GHz band and is backwards-compatible with 802.11b. The 802.11b, 802.11a and 802.11g can all operate in the same environment without causing interference with each other if well designed at installation.

APs can support a small group of users in a given range; the theoretical number of clients supported by an 802.11b AP is 256 within a 100-foot range (the theoretical number of clients for 802.11a is 1,024). Depending on usage patterns, 20–30 users are recommended for optimal performance. For example, e-mails with attachments require more bandwidth than e-mails with no attachments, and VoIP over WLANs or video applications will require substantially more bandwidth and may influence the above recommended user per AP.

The range of access points is related to speed. As the distance between AP and wireless client increases, the speeds decrease, and vice versa. Building materials, floor plans and environmental factors also affect the range. The wireless industry provides estimates for indoor and outdoor ranges to be 100 ft. (30 m.) and 200 ft. (60m.) wireless communications based on the 802.11b standards. Using a wireless site survey tool is recommended to measure signal strength at various locations throughout the site to determine the number of and positioning of APs for good signal coverage of the area.

3 Business Value for this Technology Standard

The business value of this technology standard is multifaceted. On the compatibility value stream, standards ensure wide spread compatibility for NIH laptops and Guest computers (where allowed). This compatibility equates to reduced labor for installation and support. This also allows for better planning for future expansion and technology upgrades of wireless networks. WLANS allow broad access to NIHnet where allowed. A clearly defined Architecture allows security professionals to add tools to the suite of security technical controls in order to protect NIHnet from unauthorized access. The multifaceted business values save money, increase user satisfaction and bring best value to the government through efficient and effective wireless networks.

4 NIH Wireless LANs

This brick provides baseline information of the as-is architecture (Baseline) and the future directions (Tactical and Strategic) of the use of WLAN technologies at NIH. Specific standards identified in the brick apply to both wireless clients (adaptors) and access points (AP). Vendors identified in the brick pertain only to AP technologies.

It should be noted that all technologies that are new to the brick are emboldened, and all technologies removed from the brick upon its update are indicated with a strikethrough.

Table 1. Wireless LANs Brick

| Tactical Deployment (0-2 years) | Strategic Deployment (3-5 years) |
|---|--|
| Wireless Standards <ul style="list-style-type: none"> ■ 802.11g ■ 802.11n Vendors <ul style="list-style-type: none"> ■ Cisco Systems ■ Enterasys Networks | <ul style="list-style-type: none"> ■ 802.11n |
| Retirement Targets (Technology to eliminate) | Containment (No new deployments) |
| <ul style="list-style-type: none"> ■ None | Wireless Standards <ul style="list-style-type: none"> ■ 802.11b ■ Bluetooth Vendors <ul style="list-style-type: none"> ■ Apple ■ 3Com ■ Netgear |
| Baseline Environment (Today) | Emerging (Technology to track) |
| Wireless Standards <ul style="list-style-type: none"> ■ 802.11b ■ 802.11g ■ 802.11n ■ Bluetooth NIH Access Point (AP) Vendors <ul style="list-style-type: none"> ■ Apple ■ Cisco Systems ■ Enterasys Networks ■ 3Com ■ Netgear | <ul style="list-style-type: none"> ■ 4G data services as provided by cell phone carriers ■ LTE - Long Term Evolution (LTE) ■ HSPA - High Speed Packet Access |
| Comments | |

- Tactical and Strategic products were selected to leverage NIH's investment in products that are a proven fit for NIH's known future needs. Leveraging baseline products in the future will minimize the operations, maintenance, support and training costs for new products.
- Some baseline products have been designated as Containment. These products are either not as widely or successfully deployed at NIH, or they do not provide as much functionality, value, or Total Cost of Ownership as low as the selected Tactical and Strategic products.
- This brick is intended to address WLAN access points as part of NIHnet.
- Enterprise users expect IT to provide access and support.
- Wireless Networks are moving from networks of convenience to ubiquitous wireless access coverage
- New wireless deployments will be coordinated with CIT to ensure compatibility across NIH.
- Because wireless networks are over the air networks, design considerations for good signal coverage for the work area must be taken into consideration
- A VPN account is required for full network access for staff.
- Guest access is available on request in public areas such as the Clinical Research Center and large conference rooms.
- WLAN has been rolled into nearly every smartphone, printer, digital cameras, and many other electronic devices including motor vehicles. Continuous vigilance will be required to secure the enterprise during the continued expansion of "IT consumerization" of ad-hoc Wireless LANs at NIH.
- Because the 802.11 standards rely on the unlicensed spectrums, any number of other devices can be attempting to use that spectrum, causing performance and connection issues.

5 Links

The following links are relevant to the standard at NIH.

- What is a Brick ?
<http://enterprisearchitecture.nih.gov/ArchLib/Guide/WhatIsBrick.htm>
- How to Create and Publish a Technical Standard at NIH
<http://enterprisearchitecture.nih.gov/About/Approach/StandardsDevelopmentProcess.htm>
- Wireless LAN Brick Standards at NIH
<http://enterprisearchitecture.nih.gov/ArchLib/AT/TA/WirelessLANBrick.htm>
- VPN at NIH <http://itservicesdesk.nih.gov/index.asp?Section=FAQS&Cat=15>
- VPN Tools http://cit.nih.gov/ServiceCatalog/VPN_Tools.htm

6 Summary of Comments

Comment:

Add 3G to the baseline.

Response:

4G is included – the ITMC – EA group did not feel the 3G technology provided a wireless broadband experience from a wireless device.

Comment:

There was discussion about 802.11a in the document, but it did not end up in Table 1 of NIHRFC0066.

Response:

802.11a is a foundational technology standard for all 802.11 technologies including the current suggested tactical and strategic ones

Comment:

The guest wireless at NIH is so difficult to use its almost non-functional. Don't know if this is where to address it but I was part of the original domain team with John Dvorak and we implemented the available technology which is now about ten years obsolete. NIH should go to some kind of captive portal solution for guest access that actually works for guests.

Response:

We think this is a good question but we feel this is better addressed on the operational side of wireless at NIH not as a technology clarification

7 Contact

To contact the NIHRFC Editor, send an email message to EnterpriseArchitecture@mail.nih.gov

8 Changes

| Version | Date | Change | Authority | Author of Change |
|---------|---------|------------|-----------|------------------|
| 1.1 | 5/24/10 | Initiation | | Joe Klosky |

OCIO/ITAO
NIHRFC0066
Category: Standards

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OD
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| | | | | |
|-----|-----------|--|------------|----------------|
| 1.2 | 6/7/10 | Minor formatting changes | NIHRFC0001 | Kiley Ohlson |
| 1.3 | 7/15/10 | Minor editorial changes | NIHRFC0001 | Mark Silverman |
| 1.4 | 8/18/10 | Updated based on ITMC EA Subcommittee comments | NIHRFC0001 | Zahra Ashraf |
| 1.5 | 8/23/2010 | Updated to include Summary of Comments | NIHRFC0001 | Zahra Ashraf |
| 2.0 | 8/24/2010 | Approved by the ARB | NIHRFC0001 | Zahra Ashraf |

9 Author's Address

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