

### 4.2.3 Hardware Environmental Ratings/Specifications

Dynamic Wireless recommends that mesh nodes in a outdoor environments must be rugged and able to withstand the following four criteria:

- High operating temperatures
- Dust-tight and water proof to IP67 standards
- Wind-survivability - Although this is of more importance to coastal areas affected by cyclones)
- Protected against shock and vibration (if a mesh node is to be installed on a mobile vehicle/trailer)

Below are the environmental specifications for the leading carrier-grade wireless mesh products in the market, with the important four criteria highlighted in green:

Specification	Huawei AP6610DN-AGN	Cisco (1552E)	Tropos (7320)	Aruba AirMesh MSR4000	Ruckus ZoneFlex 7782-N
Dimensions	8.3 cm x 25.5 cm x 25.5 cm	30.48 cm x 19.81 cm x 16.26 cm	33.02 cm wide x 20.32 cm deep x 13.50 cm high	32.5 cm x 29 cm x 13.5 cm	23.9 cm (L), 19.5 cm (W), 11.8 cm (H)
Weight	2.2 Kg	7.8 Kg (w/out mounting brackets)	7.20 Kg w/ mounting brackets	5.5 Kg	2.4 Kg
Operating Temperature	-40°C to +60°C	-40°C to 55°C	-40°C to 55°C	-30°C to 60°C (For PoE Pwr) -40°C to 55°C (For AC Pwr)	-40°C to -65°C
Storage Temperature	-40°C to +70°C	-50°C to 85°C	-40°C to 85°C	-30°C to 70°C	Not Specified
Operating Humidity	0% to 100% (non-condensing)	Not Specified	Not Specified	Not Specified	5% to 100% Condensing
Wind Resistance	Not Specified	Up to 161 Km/h sustained winds Up to 265 Km/h wind gusts	Wind survivability: >265 Km/h Wind loading (265 Km/h): <300 Newtons	Up to 265 Km/h	Not Specified
Enclosure IP Rating	IP67*	IP67*, NEMA Type 4X	IP67*	IP66	IP67*
Shock & Vibration	Not Specified	None Specified	<ul style="list-style-type: none"> <li>• Shock &amp; vibration: ETSI 300-19-2-4 spec T41.E class 4M3</li> <li>• Transportation: ISTA 2A</li> </ul>	ETSI 300-19-2-4 spec T41.E class 4M3	EN 61373 Shock and Vibration for Railway Applications
Other Ratings	Not Specified	None Specified	<ul style="list-style-type: none"> <li>• ASTM B117 Salt Fog rust resistance compliant</li> </ul>	Transportation: ISTA 2A	None Specified

\*6: Dust-tight, 7: Waterproof

Table 3: Environmental Specifications For Mesh Nodes

**Observations:**

- It is important to note that although the older Huawei model AP6610DN-AGN has a weather rating of IP67 (Dust Tight, Immersion up to 1 metre) suitable for outdoors, the latest Huawei WA251DT-NE model being proposed by iiNet only has a weather rating of IP66 (Dust Tight, Powerful Water Jets). As a mesh AP would not be subject to immersion for this project, either IP66 or IP67 should be fine. However most other vendor mesh APs listed in the table are IP67, so it is unusual that they would lower the IP rating one lower from the previous mesh AP models. This slight difference is highlighted for your attention, should the wireless mesh APs you purchase be required to be subject to immersion in water up to 1 metre.
- A wind-rating has not been specified by Huawei for their mesh AP, whereas most other vendors (Cisco, Tropos, Aruba) have certified their mesh APs for up to 265 Km/h winds.
- A shock and transportation certification has also not been listed by Huawei for their mesh AP, this limiting its ability to be mounted on trailers and vehicles.

**4.2.4 Wireless Network Management System**

iiNet states in their proposal that *"iiNet will deploy a unique software solution called wSight. This software pro-actively monitors the network and suggests optimal locations for AP deployment to maximize coverage and capacity. This will be used during the rollout to establish demand and assist the network planners and site acquisition manager in AP location."*

Although there is a wealth of information about Cisco's Prime Infrastructure software, there is very little information about wSight and the features and functionality it provides. The only information obtainable is provided below:

*"Huawei's wSight for WLANs serves the same function as standard management systems for telecom networks by providing operators with integrated reports and featuring a smart configuration tool and web-designed infrastructure. The wSight's integrated reports display network status and network KPIs over a certain period. The wSight's smart configuration tool is used to mass-manage network equipment and configure other-vendor equipment according to operator requirements. And the wSight's web-designed infrastructure allows O&M engineers to easily and conveniently manage networks through a web browser."*

Again, without any comprehensive manuals and configuration guides for wSight, it is not possible to perform an evaluation on it, so this does represent an un-quantified risk.

#### 4.2.5 Additional Hardware Features

### 4.3 SOLUTION UPGRADEABILITY

#### 4.3.1 Hardware Upgradeability

The key determinant in the upgradeability of iiNet's proposed wireless mesh network, are the connecting of outdoor root access points back to TransACT hub sites, using Gigabit fibre optic links. This inherently allows for future upgrades as Wi-Fi technology improves and newer standards result in higher data transmissions being required from the mesh APs. As iiNet states *"Each link will have optical characteristics that allow it to be upgraded to 10-gigabit Ethernet without additional works, should the need arise."*

As the latest 802.11ac standard is initially designed to support up to 1.69 Gbit/s (Cisco's 3700 Series supports up to 1.3 Gbit/s for example), and eventually a theoretical 6.77 Gbit/s; iiNet's installed Gigabit fibre optic links to mesh APs would immediately be able to support 802.11ac mesh APs when they arrive to market, and with an upgrade to 10 Gbit/s Ethernet without additional works, be able to support all future MCS data rates included within the 802.11ac standard.

Hardware	Upgradeability
Fibre	As stated by iiNet, <i>"Each link will have optical characteristics that allow it to be upgraded to 10-gigabit Ethernet without additional works, should the need arise."</i>
VDSL2	
Mesh AP	Huawei and Cisco mesh APs are not able to be hardware upgraded to newer radio standards such as 802.11ac. No other vendor has provisioned their products for such upgrades either. The mesh AP would need to be replaced in order to support future Wi-Fi standards.
Indoor AP	<ul style="list-style-type: none"> <li>Huawei's indoor APs don't appear to support any future hardware upgrades to its radios.</li> <li>Some of Cisco's indoor range (such as the 3600 and 3700 Series APs) support future radio upgrades via expansion slots which allow for future 802.11ac radio modules to be added once released. The 802.11ac Wave 1 module is now available for the 3600 series AP, whilst the Wave 2 module for the 3700 series AP will be released in 2015.</li> </ul>

#### 4.3.2 Firmware Upgradeability

Both Huawei and Cisco hardware (controllers and APs) are firmware upgradeable, and both vendors release updates on a regular basis.

#### 4.4 CLIENT SECURITY FEATURES

##### 4.4.1 Wireless Encryption and/or Authentication

The encryption and authentication methods being offered by iiNet below for each user type are sufficient, and generally used in similar deployments around the world.

##### 4.4.2 Firewalls

##### 4.4.3 Filtering Capability (Viruses and Malware)

## 4.5 SOLUTION SCALABILITY

### 4.5.1 Coverage Scalability

Therefore iiNet has ensured scalability for all future data rates within the 802.11ac standard. To reiterate what was mentioned previously in this report, as the latest 802.11ac standard is initially designed to support up to 1.69 Gbit/s (Cisco's 3700 Series supports up to 1.3 Gbit/s for example), and eventually a theoretical 6.77 Gbit/s; iiNet's installed Gigabit fibre optic links to mesh APs would immediately be able to support 802.11ac mesh APs when they arrive to market, and with an upgrade to 10 Gbit/s Ethernet without additional works, be able to support all future MCS data rates included within the 802.11ac standard.

### 4.5.2 Client Capacity Scalability

Dynamic Wireless has always advised its own wireless customers to limit the number of simultaneous connections per AP to 30 (15 per 2.4 and 5 GHz radio) in order to ensure 1+ Mbps of throughput (from a 54 Mbps radio) to each client, assuming all clients are downloading at the same time. This is the worst case scenario at maximum capacity, which will likely never occur.

Typically it is safe to assume a 20% network utilisation ratio at any point in time. Therefore 31 clients per AP x 20% = ~6 clients, which equates to 3+ Mbps for each client. iiNet has allowed for 2 Mbps for each free client, which equates to a network utilisation of around 30%.

Therefore in summary, iiNet has designed the network to support a high number of simultaneous connections, exceeding the generally accepted minimum of 20% utilisation.

#### 4.6 OPEN NETWORK STANDARDS COMPLIANCE

##### 4.6.1 Wireless Technology based on Open Standards

The network access points will all use dual-band radios to support 2.4 GHz and 5 GHz Wi-Fi. Furthermore the entire network will support 802.11a, 802.11g and 802.11n protocols.

##### 4.6.2 Integration with Open Network Standards

###### Huawei

Huawei access points are standards compliant, adhering to all major IEEE, wireless and security standards as listed below in one of their mesh AP data sheets:

Standards compliance	<p>Safety standards:</p> <ul style="list-style-type: none"> <li>• UL 60950-1</li> <li>• IEC 60950-1</li> <li>• EN 60950-1</li> <li>• EN 60950-22</li> <li>• GB4943</li> </ul> <p>Radio standards:</p> <ul style="list-style-type: none"> <li>• FCC Part 15.247, 15.407</li> <li>• EN 300.328, EN 301.893 (Europe)</li> <li>• EMI and susceptibility (Class B)</li> <li>• FCC Part 15.107 and 15.109</li> <li>• EN 301.489-1 and -17 (Europe)</li> <li>• GB9254</li> <li>• EN60601-1-2 EMC requirements for the Medical Directive 93/42/EEC</li> </ul> <p>IEEE standards:</p> <ul style="list-style-type: none"> <li>• IEEE 802.11a/b/g, IEEE 802.11n,</li> <li>• IEEE 802.11h, IEEE 802.11d, IEEE 802.11e</li> </ul> <p>Security:</p> <ul style="list-style-type: none"> <li>• 802.11i, Wi-Fi Protected Access 2 (WPA2), WPA</li> <li>• 802.1X</li> <li>• Advanced Encryption Standards (AES), Temporal Key Integrity Protocol (TKIP)</li> </ul> <p>Multimedia:</p> <ul style="list-style-type: none"> <li>• Wi-Fi Multimedia (WMM™)</li> </ul>
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###### Cisco

Cisco access points have been widely deployed for over a decade, and comply with all of the same industry standards.

#### 4.7 TECHNICAL FEASIBILITY

##### 4.7.1 Proven Technology or Cutting-Edge Technology

Huawei's wireless mesh deployments seem to be mainly limited to deployments within China, probably due to the fact that Huawei recently entered into the carrier-grade wireless LAN market by investing in next-generation wireless access points in 2012.

iiNet states that the *"technology being deployed in Canberra will be a new series of Huawei access points derived from their work with LTE small cells. This technology has not been deployed outside of China, and the intention is that the ACT will become a global showcase for Huawei."*

Such a technology whilst certainly sounds promising and cutting-edge, without any detailed technical specifications, radio specifications and data sheets to back up their claims; cannot be assumed to be cutting-edge, it may just be hype.

According to Gartner's latest 'Magic Quadrant for the Wired and Wireless LAN Access Infrastructure' released on 3rd September 2013 (shown below), Huawei is positioned in the 'Challengers' quadrant, with an excellent Ability to Execute, but Lacking in Vision; whilst Cisco is positioned in the 'Leaders' quadrant, and comes first for its Ability to Execute, and first also for Completeness of Vision.



Source: [http://www.compunet.cz/download/magic quadrant for the wired and wireless lan access infrastructure 2013.pdf%20](http://www.compunet.cz/download/magic%20quadrant%20for%20the%20wired%20and%20wireless%20lan%20access%20infrastructure%202013.pdf)

The following excerpt about Huawei was taken from this Gartner report and contains useful information pertaining to their WLAN offering:

Huawei's Enterprise Business Group (EBG) has a strong presence in the Asia/Pacific region, including Japan, Russia and India, as well China, where 72% of its revenue was deployed for access layer solutions. The vendor has made an effort to increase its presence in EMEA during 2012 and continues to market to North America. Huawei's EBG targets healthcare, education, financial services and the public sector/government.

Huawei's Smart Campus solution shows the vendor's vision of end-to-end campus networking in mobility, programmability and video optimization. With its strong carrier heritage, we traditionally see Huawei in the data center or core of large enterprises, but with its new access layer products, including the launch of a controllerless WLAN architecture, we expect to see more Huawei solutions deployed in the access layer. Huawei's eSight network management, eSight TSM and application security gateway provide guest access, onboarding, security and network management.

Huawei should be considered for any enterprise network opportunity within the service provider market, as well as for opportunities where it has a geographical presence.

#### Strengths

- In 2012, Huawei invested in next-generation wireless access points, switches, and network services and network security, which give it a rich portfolio of products and the resources to be able to deliver to new markets.
- Huawei has the ability to deploy end-to-end multivendor wired and wireless network management, security, firewall, guest access, policy enforcement applications for enterprises looking for a single vendor. The vendor's solutions can provide differentiation through its automatic network quality analysis, which looks to optimize the network as well as its green energy saving initiatives.
- Huawei has an extensive reseller channel and Gartner also sees it selling to service providers.

#### Cautions

- Enterprises looking to deploy in carpeted office environments should review the available information on application functionality for requirements to ensure that it meets their specific network service application needs.
- Huawei solutions are technically capable; however, limited marketing communications continue to limit enterprise awareness in its target markets.
- The vendor has had challenges in expanding its market outside of the Asia/Pacific region, and enterprises should request references for implementation and service of new wired and wireless products and services, especially outside of that region.

A review of Cisco is also provided at the following Gartner report link:

[http://www.compunet.cz/download/magic\\_quadrant\\_for\\_the\\_wired\\_and\\_wireless\\_lan\\_access\\_infrastructure\\_2013.pdf%20](http://www.compunet.cz/download/magic_quadrant_for_the_wired_and_wireless_lan_access_infrastructure_2013.pdf%20)

#### 4.7.2 History of Technology being used in Wireless Broadband Deployments

##### Huawei

Huawei's wireless background comes from GSM based and now 3G and LTE based technologies. Although they are very strong in these technologies, they are recent entrants to the carrier-grade Wi-Fi mesh market, releasing their first products in 2013. Therefore there has only been a very short history of deployments and mostly, if not exclusively in China. Dynamic Wireless was unable to find any case studies for their wireless mesh deployments, within China or the rest of the world. Their history of firmware updates has not been long either, and due to the lack of deployments and rigorous testing, there may be potential for more bugs in their firmware.

##### Cisco

Cisco on the other hand, has a long history of developing and deploying Wi-Fi solutions, since their very first wireless acquisition 'Aironet Wireless Communications' in November 9, 1999 which provided them with their first autonomous APs. Later, their acquisition of Airespace provided them with a foothold into the lightweight architecture, and now they have most recently entered the Wireless Cloud Networking market via their acquisition of Meraki.

For your own information, a complete list of Cisco's wireless acquisitions is provided below:

Acquisition Date	Company Acquired	Value (USD)
September 15, 1998	Clarity Wireless	\$157,000,000
November 9, 1999	Aironet Wireless Communications	\$799,000,000
November 13, 2000	Radiata	\$295,000,000
December 14, 2000	ExiO Communications	\$155,000,000
January 12, 2005	Airespace	\$450,000,000
November 19, 2012	Meraki	\$1,200,000,000

## 5. NON-TECHNICAL REVIEW

### 5.1 SUMMARY

The table below provides a summary of the detailed non-technical review that follows. This summary provides a quick overview, and can be delved into further by going to the appropriate section.

**Note:** Due to iiNet essentially having a N+1 proposal, whereby if their Huawei proposal is not accepted then they will offer an alternative backup Cisco proposal; the Risk Assignment for some categories will vary depending on whether Huawei or Cisco are chosen as the final solution.

Non-Technical Review	Risk (1-Very Low,2-Low, 3-Medium Risk, 4- High Risk, 5-Extreme Risk)	Comments
<b>Vendor Suitability</b>		
<b>Suitability for Australian Market</b>	3- If Huawei chosen 1- If Cisco chosen	Although the ACT Government may have no technical issue with Huawei, they may have a security issue around their hardware, based on a previous precedent set by the Australian Government, and therefore the risk that Huawei could be excluded from the ACT Government's Free Wi-Fi Project, needs to be taken into account. This is further discussed in the report. For this reason Huawei has been assigned a medium (3) risk.
<b>Local Hardware Vendor Support Availability</b>	2- If Huawei chosen 1- If Cisco chosen	Huawei has office located in 3 locations around Australia, as well as Technical Assistance Centers (TAC) located in the United States and the United Kingdom, open 24/7, 365 days per year. However this is still less support than Cisco, hence a risk assignment if 2 is applicable.
<b>Hardware Vendor Size and Stability</b>	1- If Huawei chosen 1- If Cisco chosen	Both vendors are very large, strong and stable companies. <b>Huawei</b> - has 140,000 employees (2012) and annual revenue of US\$ 39.2 billion (2012) <b>Cisco</b> - has 75,000 employees (2013) and annual revenue of US\$ 48.6 billion (2013) with assets totaling US\$ 101 billion (2011)
<b>Number and size of mesh deployments globally</b>	4- If Huawei chosen 1- If Cisco chosen	<b>Huawei</b> - As they are a recent entrant to this market (2012 onwards), no case studies could be found on their website. <b>Cisco</b> - Provides a large number of wireless mesh case studies on their website, including one local Australian case study for the University of Queensland, who has deployed a Cisco wireless mesh network consisting of 75 outdoor mesh APs and 3500 indoor.
<b>Wireless/Radio Technology Patent Search</b>	3- If Huawei chosen 1- If Cisco chosen	A Google patent database search for 'wireless mesh' returned the following: <b>Huawei</b> - 3 Granted, 6 Applications Pending <b>Cisco</b> - 34 Granted, 8 Pending For this reason, Huawei was assigned a medium (3) risk. A complete breakdown of patents for each vendor is provided in this report.
<b>Vendor Commitment to Product Development and</b>	2-If Huawei chosen 1- If Cisco chosen	<b>Huawei</b> - has an extensive Enterprise Support Portal providing Product Support, Knowledge Base and Firmware downloads. <b>Cisco</b> - provides a dedicated firmware download portal, and

<b>Firmware Updates</b>		has an excellent 'known' track record of releasing firmware updates with increased functionality and bug fixes, usually on time or close to their stated release date.
<b>Warranty and Expected Equipment Lifetime</b>	1- If Huawei chosen 2- If Cisco chosen	<p><b>Huawei</b> - Standard Warranty Duration is either 1 (one) year or 3 (three) years depending on the product. Their mesh APs are 1 year warranty. Also, warranty support after end-of-life is 5 years.</p> <p><b>Cisco</b> - All Cisco hardware and software products are covered by warranty for a minimum of 90 days. Cisco 1550 and 1530 mesh AP warranty periods are 1 year, however their indoor 3600 series AP warranty period is just 90 days. Their warranty support after end-of-life is also 5 years. Due to the lower warranty for indoor APs, Cisco was assigned a risk of 2, while Huawei 1.</p>

## 5.2 VENDOR SUITABILITY

### 5.2.1 Suitability for Australian Market

In iiNet's response to 1. Assumptions, they state that:

*"iiNet has assumed that the ACT government has no technical issue with Chinese company Huawei providing the network equipment for this project, however it has allowed for an alternative vendor if necessary"*

The alternative vendor iiNet has chosen is Cisco Systems outdoor wireless mesh solution.

Although the ACT Government may have no technical issue with Huawei, they may have a security issue around their hardware, based on a previous precedent set by the Australian Government, and therefore the risk that Huawei could be excluded from the ACT Government's Free Wi-Fi Project, needs to be taken into account.

In March 2012, Australia media sources reported that the Australian government had excluded Huawei from tendering for contracts with NBN Co, a government-owned corporation that is managing the construction of the National Broadband Network, following advice from the Australian Security Intelligence Organisation (ASIO) regarding security concerns. [Australian Financial Review (2012). China's Huawei banned from NBN. Retrieved 26 March 2012], Source: [http://www.afr.com/p/technology/china\\_giant\\_banned\\_from\\_nbn\\_9U9zi1oc3FXBF3BZdRD9mJ](http://www.afr.com/p/technology/china_giant_banned_from_nbn_9U9zi1oc3FXBF3BZdRD9mJ)

The Attorney-General's Department stated in response to these reports that the National Broadband Network is "a strategic and significant government investment, [and] we have a responsibility to do our utmost to protect its integrity and that of the information carried on it." [The Wall Street Journal (2012). Canberra Talks Integrity After Reportedly Banning Huawei From NBN. Retrieved 26 March 2012], Source: <http://blogs.wsj.com/dealjournal/australia/2012/03/26/canberra-talks-integrity-after-reportedly-banning-huawei-from-nbn>

In addition, most recently with the change of Government, Tony Abbott has categorically ruled out any participation by Chinese telecommunications giant Huawei in the National Broadband Network. [The Australian (November 2013). Tony Abbott says Huawei ban will stay. Retrieved 01 November 2013], Source: <http://www.officeworks.com.au/retail/products/Catering-and-Cleaning/Water-and-Water-Dispensers/Water-Coolers/AQ2GOHOT>

Although the ACT Government's Free Wi-Fi Project is not part of the NBN rollout, it could be argued that the Free Wi-Fi deployment across Canberra is also a strategic and significant wireless broadband deployment, which also has the potential for a large amount of government staff using the network, and to send confidential information. As a precedent has been set via the March 2012 exclusion of Huawei from tendering for NBN contracts, typically such moves filter down the government hierarchy.

## 5.2.2 Local Hardware Vendor Support Availability

### Huawei

Huawei has offices located in 3 locations around Australia below:

<p><b>Australia . Brisbane</b> Unit 10 Cargo Business Park, 56 Lavarack Avenue, Eagle Farm, Brisbane, QLD 4009</p> <p><b>Australia . Melbourne</b> Level 6, 564 St Kilda Rd, Victoria Tel:00613 8610 0600 Fax:00613 9510 2477</p> <p><b>Australia . Mobile Hotline(Include Mobile Phone,Data Card and Home Device product support)</b> Hotline:1800 330 943 Support Language:English Support Time: 9:00AM-06:00PM Local Time, Monday-Friday</p> <p><b>Australia . Sydney</b> Level5,TowerA,799 Pacific Highway, Chatswood,Sydney,NSW, Australia 2067 Tel:0061-2-99283888 Fax:0061-2-94118533</p>
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In addition they have Technical Assistance Centres (TAC) located in the United States and the United Kingdom, open 24/7, 365 days per year. The main function of their TAC is to provide:

- Support for technical enquiries
- Support for spares and repairs management
- Network and product enhancement reporting
- Hardware, firmware and software upgrades
- Customer reporting via Service Level Agreements and management reviews.

## Cisco

Cisco Systems has a very strong local presence in Australia and in terms of local vendor support, and is second to none. Cisco has the advantage of having a Technical Assistance Centre (TAC) in Australia servicing Australia and South-East Asia and is one of the few major TAC's in the world.

Cisco's Head Quarters are located in Sydney:

### **Cisco Systems Australia Pty., Ltd.**

*Australian Head Office and NSW Branch  
L10, 80 Pacific Highway, North Sydney 2060, Australia  
PO BOX 469, North Sydney, NSW 2059, Australia  
Phone: +61 2 8446 6000  
Fax: +61 2 8446 8400*

Branch Offices exist in every State/Territory in Australia (with the exception of the Northern Territory and Tasmania), and of importance to the ACT Government, Cisco has a local Canberra office:

### **Cisco Systems Canberra Office**

*Brindabella Business Park  
18-20 Brindabella Circuit  
Canberra International Airport, ACT 2609  
Australia  
Phone: +61 2 6216 0600  
Fax: +61 2 6273 7455*

Specialised wireless experts are available in the Canberra office, and failing their assistance, the TAC in Sydney is available locally, with world-wide TACs available 24x7.

### 5.2.3 Hardware Vendor Size and Stability

#### Huawei

Huawei is a Chinese multinational networking and telecommunications equipment and services company headquartered in Shenzhen, Guangdong. It is the largest telecommunications equipment maker in the world, having overtaken Ericsson in 2012, and has 140,000 employees (2012) and annual revenue of US\$ 39.2 billion (2012). Its products and services have been deployed in more than 140 countries and it currently serves 45 of the world's 50 largest telecoms operators. Huawei are here to stay for the long term.

#### Cisco

As an American multinational corporation with 75,000 employees (2013) and annual revenue of US\$ 48.6 billion (2013), Cisco are the largest vendor of consumer electronics, networking, voice, and communications technology and services in the world. Having been founded in 1984 and with assets totaling US\$ 101 billion (2011). Cisco are here to stay for the long term.

Cisco has proven themselves adept at providing innovation after innovation, leading the market with new technologies, and changing their strategic direction according to future technology trends they foresee.

### 5.2.4 Number and size of mesh deployments globally

#### Huawei

Dynamic Wireless was unable to find any case studies on Huawei's website, relating to wireless mesh deployments they have implemented around the world. As they are a recent entrant to this market (2012 onwards), this is probably one of the reasons why.

#### Cisco

Cisco however did provide a large number of wireless mesh case studies (27 in total) on their website, including one local Australian case study for the University of Queensland, who has deployed a Cisco wireless mesh network consisting of 75 outdoor mesh APs, as well as 3500 indoor APs.

Cisco's wireless mesh case studies can be accessed at the address below:

<http://www.cisco.com/c/en/us/products/wireless/aironet-1520-series/case-study-listing.html>

A summary of Cisco's wireless mesh case studies is shown below:

**Education**

- [Marquette University Extends Video Surveillance and Crime Rates Drop](#) (PDF - 878KB)
- [University Becomes Leader in Wireless Video Surveillance](#) (PDF - 185KB)
- [University of Queensland Creates a Collaborative Academic Experience With World's Largest 802.11n Wireless Network](#)
- [College Expands Educational Horizons Wirelessly](#)
- [Major University Finds Tools to Attract New Students](#) (PDF - 162KB)

**Energy**

- [Petroleum Company Improves Real-time Information Sharing with Rigs](#) (PDF - 242KB)

**Government**

- [Spanish City Transforms into Urban Mobility Center](#) (PDF - 306KB)
- [Pruszkow Goes Wireless With Support From Cisco and BT](#)
- [Brazil's Baixada Fluminense Region Connected by Cisco Wireless Mesh Technology](#)
- [City of Bowling Green Uses Mobile Wireless Network for Public Safety](#) (PDF-72KB)
- [Austin's Wireless Mesh Provides Free Access and Test Environment](#)
- [Bringing New Businesses to Madison with Wireless Networking](#)
- [City Deploys Municipal Wireless Network](#) (PDF - 288KB)
- [City Government Improves Service and Stimulates Local Economy](#)
- [City of Jerusalem \(Israel\) Video Case Study](#)
- [City of Tiradentes \(Brazil\) Video Case Study](#)
- [City of Westminster \(United Kingdom\) Video Case Study](#)
- [Growing City Uses Wireless Communications to Improve Public Safety](#)
- [Italian Province Deploys Massive Wireless Mesh Network Video Case Study](#)
- [Testing Center Sets Standard for State-of-the-Art Auto Development](#) (PDF - 1MB)
- [Ville de Luxembourg Hot City Project - Outdoor Wireless for Citizens](#)
- [Wireless Traffic Management Network for Downtown Renewal](#) (PDF - 1MB)
- [Wired and Wireless Video Surveillance Cameras Help Police Department Increase Situational Awareness](#)

**Public Access**

- ['Digital Coastline' in City of Rio de Janeiro Connected by Cisco Wireless Technology](#)
- [Cleveland Zoo Deployed The Cisco Outdoor Wireless Network For Distance Learning Video Case Study](#)
- [Parking Meter Company Creates New Business Model with Wi-Fi](#) (PDF - 151KB)
- [Public-Private Wireless Partnership Mobilizes City Workers](#)

Source: <http://www.cisco.com/c/en/us/products/wireless/aironet-1520-series/case-study-listing.html>

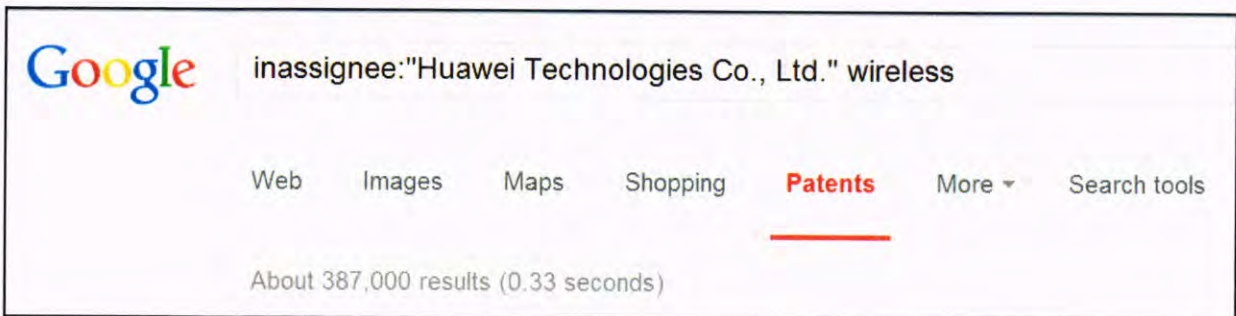
### 5.2.5 Wireless/Radio Technology Patent Search

This section regarding wireless mesh patents has been specifically added to the evaluation criteria, as it provides a very good indicator as to the level of commitment the vendor has to its own mesh hardware development, and to the field of mesh networking as a whole. A lack of patents tends to indicate a lack of engineering resources and lack of commitment to product research and development. Some vendors simply use existing wireless technology in the market and add layers of 'hype' around their technology. Their promises can easily be debunked by taking a look at their technology patents.

Dynamic Wireless has searched through Google's Patent Database, to check how many patents Huawei and Cisco (the backup option should Huawei not be accepted by the ACT Government) have been granted and how many are pending, with regards to wireless mesh networking.

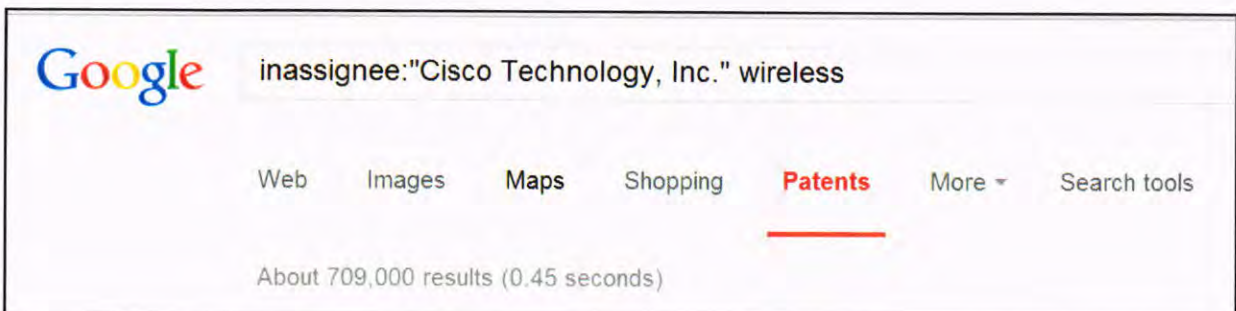
A summary of the total number of generic 'wireless' patents (granted + applications) for Huawei and Cisco yielded the following results. Both vendors have a respectable amount of wireless IP.

#### Huawei Wireless Patent Summary



The screenshot shows a Google search for patents. The search bar contains the text "inassignee:"Huawei Technologies Co., Ltd." wireless". Below the search bar, there are navigation tabs: "Web", "Images", "Maps", "Shopping", "Patents" (which is highlighted with a red underline), "More", and "Search tools". Below the tabs, it says "About 387,000 results (0.33 seconds)".

#### Cisco Wireless Patent Summary



The screenshot shows a Google search for patents. The search bar contains the text "inassignee:"Cisco Technology, Inc." wireless". Below the search bar, there are navigation tabs: "Web", "Images", "Maps", "Shopping", "Patents" (which is highlighted with a red underline), "More", and "Search tools". Below the tabs, it says "About 709,000 results (0.45 seconds)".

### Huawei Wireless Mesh Patents

A complete list of Huawei's 'wireless mesh' patents are provided below. This is by no means definitive, and is what was able to be found through Google's Patent Search. Their number of wireless patents, specifically relating to wireless mesh, are very few when compared with Cisco.

#### Issued Patents:

Line #	Patent #	Issue Date	Description
1	PCT/CN2008/073615	Dec 19, 2008	A network authentication communication method and a mesh network system
2	US8165040 B2	Apr 24, 2012	Method for routing mobile node in wireless mesh network and a communication system thereof
3	EP2259504 B1	Jul 31, 2013	A method and node for notifying proxy updating in radio mesh network

#### Current Patent Applications: (yet to be granted)

Line #	Application #	Filing Date	Description
1	PCT/CN2009/070323	Jan 24, 2009	Method and device for improving the management of wireless mesh networks
2	PCT/CN2009/070322	Jan 24, 2009	Method, device and system for assigning channels in wireless mesh networks
3	EP20090722279	Mar 13, 2009	Network route establishing and data transmitting method and network node - The disclosure relates to the mesh network technology
4	EP20090842476	Mar 30, 2009	Method, network system and device for realizing data retransmission
5	PCT/CN2009/071307	Apr 16, 2009	Route method, equipment and system
6	US 13/650,706	Oct 12, 2012	Method, node, and system for notifying proxy update in Wireless Mesh Network (WMN)

### Cisco Wireless Mesh Patents

Cisco holds an enormous number of patents across the entire data communications field, however we have specifically searched for Cisco's wireless mesh related patents in Google's Patent Database with the results of our search provided below. A complete list of Cisco's 'wireless mesh' patents are provided below. This is by no means definitive, and is what was able to be found through Google's Patent Search.

#### Issued Patents:

Line #	U.S Patent #	Issue Date	Description
1	7496078	Feb 24, 2009	Route tree building in a wireless mesh network
2	7505450	Mar 17, 2009	Configuration of failure and acquire timeouts to facilitate recovery from failures in hierarchical mesh networks
3	7508787	Mar 24, 2009	Graphical selection of information display for wireless mesh hierarchies
4	7606178	Oct 20, 2009	Multiple wireless spanning tree protocol for use in a wireless mesh network
5	7613128	Nov 3, 2009	Node exclusion within a network
6	7660318	Feb 9, 2010	Internetworking support between a LAN and a wireless mesh network
7	7653011	Jan 26, 2010	Spanning tree protocol for wireless networks
8	7688762	Mar 30, 2010	Mesh backhaul network planning
9	7720010	May 18, 2010	Tree based wireless mesh for an OSPF network with intra-tree communication optimization
10	7729328	Jun 1, 2010	Real-time sessions for wireless mesh networks
11	7787361	Aug 31, 2010	Hybrid distance vector protocol for wireless mesh networks
12	7822064	Oct 26, 2010	Backhaul-level call admission control for a wireless mesh network
13	7839856	Nov 23, 2010	Centrally controlled routing with tagged packet forwarding in a wireless mesh network
14	7843817	Nov 30, 2010	Congestion control in wireless mesh networks
15	7843807	Nov 30, 2010	Fault reporting tag for mesh access points
16	7849216	Dec 7, 2010	Channel assignment for a multi-channel dual-radio mesh backhaul
17	7899027	Mar 1, 2011	Automatic route configuration in hierarchical wireless mesh networks
18	7936681	May 3, 2011	Cross-layer design techniques for interference-aware routing configuration in wireless mesh networks
19	7978725	Jul 12, 2011	Dynamic modification of contention-based transmission control parameters achieving load balancing scheme in wireless mesh networks
20	8014329	Sep 6, 2011	Path selection and power management in mesh networks
21	8023482	Sep 20, 2011	Dynamic rate limiting in wireless mesh networks
22	8023478	Sep 20, 2011	System and method for securing mesh access points in a wireless mesh network, including rapid roaming
23	8037305	Oct 11, 2011	Securing multiple links and paths in a wireless mesh network including rapid roaming
24	8040791	Oct 18, 2011	Coordinated channel change in mesh networks
25	8155007 B2	Apr 10, 2012	Path optimization for mesh access points in a wireless mesh network
26	8259635 B2	Sep 4, 2012	Automatic clustering of wireless network nodes toward selected mesh access points

27	8270382 B2	Sep 18, 2012	System and method for securing mesh access points in a wireless mesh network, including rapid roaming
28	8111684 B2	Oct 30, 2012	Path shortening in a wireless mesh network
29	8305996 B2	Nov 6, 2012	Access point profile for a mesh access point in a wireless mesh network
30	8346238 B2	Jan 1, 2013	Mesh communication network and devices
31	8391255 B2	Mar 5, 2013	Content throughput on wireless mesh networks
32	1886451 B1	Mar 20, 2013	Multiple wireless spanning tree protocol for use in a wireless mesh network
33	8559306 B2	Oct 15, 2013	End-to-end packet aggregation in mesh networks
34	8583978 B2	Nov 12, 2013	Multicast message retransmission - a method of distributing a multicast message in a wireless mesh network

**Current Patent Applications: (yet to be granted)**

Line #	Application #	Filing Date	Description
1	11/213,292	Aug 26, 2005	Slot-based transmission synchronization mechanism in wireless mesh networks
2	11/502,207	Aug 9, 2006	Method and apparatus for transferring network management information to wireless nodes
3	EP20070815085	May 23, 2007	Graphical selection of information display for wireless mesh hierarchies
4	11/935,033	Nov 5, 2007	Mesh Tree Formation in Wireless Networks
5	12/030,650	Feb 13, 2008	End-to-End Packet Aggregation in Mesh Networks
6	12/114,822	May 5, 2008	Distributed Bi-Directional Flow Control in Wireless Mesh Networks
7	12/884,615	Sep 17, 2010	Fault Reporting Tag for Mesh Access Points
8	US 13/176,857	Jul 6, 2011	Adapting Extensible Authentication Protocol for Layer 3 Mesh Networks

**Icomera Wireless Patents**

For the sake of completeness, a complete list of Icomera's wireless patents are provided below. This is by no means definitive, and is what was able to be found through Google's Patent Search.

**Issued Patents:**

Line #	U.S Patent #	Issue Date	Description
1	EP20000930030	Jan 26, 2005	A system for data transmission via several communication routes

**Current Patent Applications: (yet to be granted)**

Line #	Application #	Filing Date	Description
1	EP20010981284	Nov 8, 2001	A method for secure packet-based communication between two units via an intermedia unit
2	US 10/483,960	Jun 28, 2002	Network-aware application in a 4g environment
3	EP20030024670	Oct 28, 2003	Mounting of an antenna on a vehicle roof with maintained high voltage protection
4	EP20070116497	Sep 14, 2007	A method and a system for providing data communication on-board trains in a plurality of carriages
5	EP20100197423	Dec 30, 2010	Wireless train communication system
6	US 13/459,883	Apr 30, 2012	Vehicle communication system
7	US 13/895,628	May 16, 2013	Wireless communication system for moving vehicles

## 5.2.6 Vendor Commitment to Product Development and Firmware Updates

### Huawei

Huawei appears to have an extensive Enterprise Support Portal providing Product Support, Knowledge Base and Firmware downloads. Their dedicated firmware download portal can be viewed here:

<http://support.huawei.com/enterprise/softdownload>

With regards to Huawei's AP firmware updates, there appears to be releases every few months for some products, with an example shown below for one of their APs.



Software > Enterprise Networking > WLAN > AP > FIT AP > WA603DN

Product Support **Official Version**

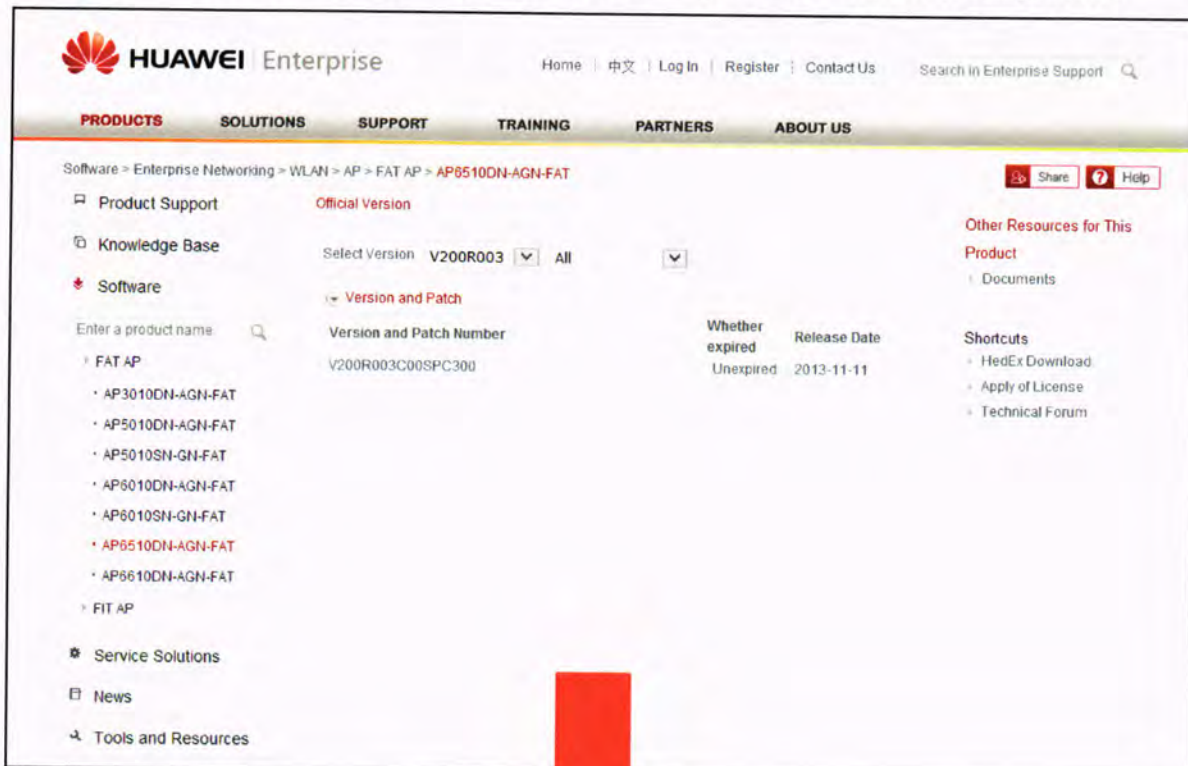
Knowledge Base Select Version V200R002 All

Software **Version and Patch**

Enter a product name

Version and Patch Number	Whether expired	Release Date
V200R002C00SPC800	Unexpired	2013-11-22
V200R002C00SPC700	Unexpired	2013-08-14
V200R002C00SPC600	Unexpired	2013-06-25
V200R002C00SPC300	Unexpired	2013-02-05

The results of viewing their firmware updates for the older mesh AP (used in the radio comparison earlier in this report), shows the following, there is only one firmware update due the product being so new.



HUAWEI Enterprise

Home | 中文 | Log In | Register | Contact Us Search in Enterprise Support

PRODUCTS SOLUTIONS SUPPORT TRAINING PARTNERS ABOUT US

Software > Enterprise Networking > WLAN > AP > FAT AP > AP6510DN-AGN-FAT

Product Support **Official Version**

Knowledge Base Select Version V200R003 All

Software **Version and Patch**

Enter a product name

Version and Patch Number	Whether expired	Release Date
V200R003C00SPC300	Unexpired	2013-11-11

Other Resources for This Product

- Documents

Shortcuts

- HedEx Download
- Apply of License
- Technical Forum

[Home](#) | [中文](#) | [Log In](#) | [Register](#) | [Contact Us](#)

PRODUCTS
SOLUTIONS
SUPPORT
TRAINING
PARTNERS
ABOUT US

Software > Enterprise Networking > WLAN > AP > FAT AP > **AP6510DN-AGN-FAT** [Share](#) [Help](#)

Product Support

Knowledge Base

Software

Enter a product name

- FAT AP
  - AP3010DN-AGN-FAT
  - AP5010DN-AGN-FAT
  - AP5010SN-GN-FAT
  - AP6010DN-AGN-FAT
  - AP6010SN-GN-FAT
  - AP6510DN-AGN-FAT**
  - AP6610DN-AGN-FAT
- FIT AP
- Service Solutions
- News
- Tools and Resources

### AP6510DN-AGN-FAT V200R003C00SPC300 [Back](#)

Application Scenario	For Business	Release Date	2013-11-11
Last Updated			
Working life	Whether expired		Unexpired
Description	Please read the "Fat AP V200R003C00SPC300 Upgrade Guide" before you upgrade the Fat AP.		

**Version and Patch Software**  
To download oversized files, click the software name to go to the download page and download the software.

Software Name	Scenario	Size	Release Date
WLAN-V200R003C00_MIB.zip.md5		59.00B	2013-11-11
WLAN-V200R003C00_MIB.zip		2.63MB	2013-11-11
u-boot.bin		315.67KB	2013-11-11
FatAP6X10XNV200R003C00SPC300.001.web.zip		2.04MB	2013-11-11
FatAP6X10XN_V200R003C00SPC300.md5		68.00B	2013-11-11
u-boot.md5		32.00B	2013-11-11
FatAP6X10XN_V200R003C00SPC300.bin		21.92MB	2013-11-11
FatAP6X10XNV200R003C00SPC300.001.web.zip.md5		75.00B	2013-11-11
FatAP6X10XN_V200R003C00SPC300.upgrade_assistant_package.bin		4.18MB	2013-11-11
FatAP6X10XN_V200R003C00SPC300.upgrade_assistant_package.md5		32.00B	2013-11-11

**Release Documentation**

- Fat AP V200R003C00SPC300 Upgrade Guide
- FAT AP3x10xN&5x10xN&6x10xN V200R003C00SPC300 Release Notes

**Other Resources for This Product**

- Documents

**Shortcuts**

- HedEx Download
- Apply of License
- Technical Forum

### Cisco Mesh

It goes without saying that Cisco has an excellent 'known' track record of releasing firmware updates with increased functionality and bug fixes, usually on time or close to their stated release date. Cisco provides a dedicated firmware download portal which can be viewed here:

<http://www.cisco.com/cisco/software/navigator.html?a=a&i=rpm>

With regards to Cisco's outdoor mesh AP firmware updates, they appear to release a major update at least every year. After searching for Cisco's outdoor wireless mesh firmware updates, we identified the following releases for the 1552 mesh AP which iiNet is proposing as the alternative proposal to Huawei:

### Cisco 1552 Mesh AP

The screenshot shows the Cisco Download Software page for the Cisco Aironet 1552 Outdoor Access Point. The page title is "Download Software" and the breadcrumb trail is "Downloads Home > Products > Wireless > Outdoor Wireless > Cisco Aironet 1550 Series > Cisco Aironet 1552 Outdoor Access Point > Lightweight AP IOS Software-15.2.4-JA1". The main heading is "Cisco Aironet 1552 Outdoor Access Point" and the selected release is "Release 15.2.4-JA1 ED". The page lists "Latest Releases" and "All Releases" with a tree view showing the selected release. The "File Information" section shows "WIRELESS LAN LWAPP" with file name "c1520-k9w8-tar.152-4 JA1.tar". The "Release Date" is "31-JUL-2013" and the "DRAM/Flash" size is "64 / 32". There are "Download" and "Add to cart" buttons.

File Information	Release Date	DRAM/Flash	
<b>WIRELESS LAN LWAPP</b> c1520-k9w8-tar.152-4 JA1.tar	31-JUL-2013	64 / 32	<input type="button" value="Download"/> <input type="button" value="Add to cart"/>
<b>WIRELESS LAN LWAPP</b> c1520-k9w8-tar.124-23c JA7.tar	30-JAN-2013	64 / 32	<input type="button" value="Download"/> <input type="button" value="Add to cart"/>

There appears to be two major firmware updates for Cisco's 1552 mesh AP.

## 5.2.7 Warranty and Expected Equipment Lifetime

### Huawei Wireless Mesh

Huawei's Enterprise Product Warranty Policy (V1R2) states that their *"Standard Warranty Duration is either 1 (one) year or 3 (three) years depending on the product. For products covered by Standard Warranty, the period will be ninety (90) calendar days starting from the delivery of the replacement or the repaired unit by Huawei, or the remainder of warranty period for the original part, whichever is longer."*

In addition, in the event the Product is discontinued, Huawei warranty support is limited to 5 (five) years from the effective date of end of product ordering.

The complete Huawei Enterprise Product Warranty Policy is located at the address below:

<http://www.huawei.com/minisite/switchnow/images/Huawei%20WEU%20EBG%20Product%20Warranty%20Policy%20V1R2.pdf>

Huawei's wireless products do not appear to be listed in the table of this document, however their current wireless mesh AP data sheets state their warranty is for one (1) year (includes hardware and software).

### Cisco Wireless Mesh

Cisco states that *"All Cisco hardware and software products are covered by warranty for a minimum of 90 days. Some products have longer warranty coverage periods. Please review the information on this page for warranty details across the Cisco product line."*

Checking the Cisco 1550 and 1530 Series mesh AP datasheets, confirms they have a **1 Year Warranty**.

However their indoor 3600 Series AP has a "Limited Lifetime Hardware Warranty" which is **90 Days**.

In addition, in the event the product is made End-of-Life, spares or replacement parts for hardware will be available for a period of 5 years from the end-of-sale date. Source: <http://www.cisco.com/c/en/us/products/eos-eol-policy.html>

After the warranty period, a SMARTnet plan must be purchased in order to continue to receive support and hardware replacement.

SMARTnet gives your IT staff direct, anytime access to Cisco engineers, the Technical Assistance Center (TAC), and an extensive range of online resources. You receive fast, expert technical support, flexible hardware coverage, and smart, personalized capabilities to help you resolve critical network issues.

#### **Cisco SMARTnet Provides:**

- Global 24 hour access to Cisco Technical Assistance Center (TAC)
- Access to online knowledge base, communities and tools
- Hardware replacement options, including 2-hour, 4-hour, and next business day
- Operating system software updates
- Smart, proactive diagnostics and real-time alerts on devices enabled with Smart Call Home

The address where Cisco Warranty information is located is below:

<http://www.cisco.com/c/en/us/products/warranty-listing.html>

## 6. COST ACCURACY REVIEW

### 6.1 HARDWARE AND INSTALLATION COST

iiNet's proposed cost has been assigned a risk level of 2 (Low-Risk). A risk level of 1 (Very-Low Risk) can only be assigned if iiNet were to provide a complete breakdown of costs, which they are not expected to provide. By only providing high-level pricing with no breakdown of each individual component, this will always carry some level of risk, hence the risk assignment has been increased from 1 (Very-Low Risk) to 2 (Low-Risk).

Dynamic Wireless's experience with various large network systems integrators, has found the following approximate figures to hold true in the market, with regards to wireless mesh networks implementations:

- Hardware Cost: 70% of total proposal cost
- Physical Installation Cost: 20% of total proposal cost
- Professional Services Cost: 10% of total proposal cost

#### Cost Table 1:

<sup>1</sup> The physical installation cost can be roughly broken down into each respective installation cost per hardware component, using the '% Of Total HW Cost' provided in Cost Table 2 over the page.

Cost Table 2:

Note: The costs per unit provided by iiNet were used, as these are reasonable prices and similar to such wireless hardware on the market, such as Cisco.

## 6.2 MAINTENANCE COST

Dynamic Wireless's experience with various large network systems integrators, has found the following approximate figures to hold true in the market, with regards to annual maintenance costs for a wireless mesh network in the first five (5) years, and represents reasonable value for money:

- 1st Year Maintenance: **10%** of total solution cost (hardware + installation)
- 2nd Year Maintenance: **12%** of total solution cost (hardware + installation)
- 3rd Year Maintenance: **14%** of total solution cost (hardware + installation)
- 4th Year Maintenance: **16%** of total solution cost (hardware + installation)
- 5th Year Maintenance: **18%** of total solution cost (hardware + installation)

It is normal for the cost of maintenance to increase by a few percent each year, as the age of the hardware increases.

Applying the above figures to iiNet's maintenance cost over 5 years, yields the following result:

## 7. IMPLEMENTATION TIMEFRAME REVIEW

With regards to iiNet's indicative timings for the implementation, their 12 months to install, test and commission Canberra's Free Public Wi-Fi Network seems reasonable and is achievable.

However, the amount of time taken to implement a wireless mesh network is directly linked to how many resources (i.e. install staff, technical staff, coverage surveying staff etc) are assigned to the project. As iiNet have not provided any details on their resource allocation to the project, it is hard to put their indicative timings into perspective and gauge if they have under-allocated, or allocated ample resources to the project. Dynamic Wireless recommends that the ACT Government request iiNet for a more extensive resourcing schedule, such as in Microsoft Project format, thereby making it far easier to assess their project implementation timeframe risk. It may not be possible for them to come up with such a detailed project plan right now, but they should provide at the very least, more information as to the resources they are assigning to the implementation.

Given the above limitation with reviewing iiNet's indicative timings, the following important project milestones have been listed, and timeframes assessed:

Milestone	Total Time Taken	Review/Comments
<b>Identifying Mounting Assets</b>	2 Months (From End of Month 2 to End of Month 4)	iiNet has allocated 2 full months to these negotiations, which is good. Getting the appropriate approvals to mount on government buildings, which may come from many different government departments, is usually a tricky and time-consuming process with mesh wireless deployments. Two full months should be sufficient for this.
<b>Backend Infrastructure Installed</b>	Not Applicable	iiNet states in '2.10 Whole of Life Support (Essential)' that <i>"The network will be commissioned as it is built. It is expected that from the first day there will be an operational Wi-Fi service available."</i> This implies that the required backend infrastructure is already in place and will be commissioned as it is built, and therefore does not pose any risk to the implementation timeframe.
<b>10 mobile APs Installed</b>	1 Month (By End of Month 1)	1 mobile AP installed every 2 days. This is ample time.

<p>Coverage Surveys Complete</p>	<p>2 Months (By End of Month 12)</p>	<p>Dynamic Wireless has extensive experience in performing indoor and outdoor GPS-calibrated outdoor coverage surveys and in our experience, it would take the following time to perform (if conducting a full AirMagnet coverage survey which maps the signal strength and other metrics to a floor plan or Google Earth map if outdoors):</p> <ul style="list-style-type: none"> <li>➤ 315 Indoor Coverage Surveys: 2 months</li> <li>➤ 330 Outdoor Coverage Surveys: 2 months</li> </ul> <p>Therefore it would take a single person 4 months to complete 645 separate surveys in total. To achieve the 2 months allocated by iiNet, they would need to put at least 2 staff members on this job full-time. Dynamic Wireless recommends that the ACT Government ask iiNet for a detailed site survey schedule, and how many staff they plan to assigned to this task.</p> <p>In addition, we would advise the ACT Government to seek more answers from iiNet as to their coverage surveying procedures/technique and what survey software they use (AirMagnet, Ekahau etc).</p> <p><b><u>Important Note:</u></b></p> <p>As a general rule it is recommended NOT to use an integrator to perform post-installation coverage surveys, if they were the ones who installed the wireless access points. This is for obvious reasons, as they have a vested interest in the results being favourable. It is recommended to use an independent company for performing such surveys, who can provide a an independent view of the coverage and any gaps.</p>
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		Alternatively, if the integrator who installs the APs also performs the site surveys, then this risk can be mitigated to some extent by using an independent company to perform an audit of random wireless coverage surveys at a sample of installed sites.
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In summary, the following concerns are listed with regards to iiNet's indicative timings:

- Due to the resource allocation for iiNet's implementation not being known, there is an element of risk associated with their indicative timings. Specific items of concern are:
- iiNet have only specified by which month 100 indoor APs will be installed. They have not specified where in their indicative timings are the other 215 indoor APs being deployed? They cannot all be deployed during bad weather days when their staff are unable to install outdoor APs.
- With regards to the coverage site surveys, it is expected to take a single person 4 months to complete 645 individual surveys (indoor plus outdoor) in total. This would exceed the 2 months assigned by iiNet for this task. In order to achieve the 2 months allocated by iiNet, they would need to put at least 2 staff members on this job full-time. Dynamic Wireless recommends that the ACT Government ask iiNet for a detailed site survey schedule, and how many staff they plan to assign to this task.

Taking the above items into consideration, a risk level of Medium (3) was assigned. This risk will be reduced to Very-Low (1) if iiNet clarifies the information requests made within this Implementation Timeframe Review.

**END DOCUMENT**