



White Paper

Justifying the Wireless Enterprise

Executive Summary

- This white paper explores a broad range of Wireless LAN business and financial benefits.
- Wireless LANS provide increased mobility, save time, increase staff productivity, and dramatically reduce the costs of office moves, within a secure authenticated network.
- The Wireless LAN Products boost your business with a lower Total Cost of Ownership (TCO) and higher Return On Investment (ROI) than that for traditional wired local area networks.

1 Introduction

1.1 Why Wireless?

During the 1990s, Wireless Networking became increasingly accepted for several vertical applications in the retail and warehousing sectors for activities such as scanning and bar coding. The original Wireless networking speeds were typically 1Mbits/sec or 2Mbits/Sec and were not suitable at this time for more general enterprise office deployment.

However, during 1999, the IEEE standardised the higher speed 802.11b standard, which finally opened up the opportunity for enterprises to use Wireless as a "wire" replacement, as well as for widespread applications for Wireless within the SOHO market sector.

So why wireless? Because it allows workers in offices, warehouses, airports, hotels and many other environments to operate more productively, and with greater speed and mobility than with wired networks. We discuss these in more details in Section 2, Business Benefits.

1.2 Market Acceptance and Sizing

During the last 3 years local area Wireless networking has started to become a mainstream enterprise networking technology on a worldwide basis. The overall WLAN marketplace is expected to grow from \$4Billion in 2003, to more than \$6Billion in 2006, of which the enterprise marketplace (Access Points and Adapters) is just under 50% of the total revenue.

1.3 Justifying the Investment

Many customers ask us to try and quantify the benefits of Wireless networking. These can generally be summarised as either being qualitative business benefits, or quantitative financial benefits. In common with new networking technologies such as the arrival of the Internet in the mid-1990s, the Total Cost of Ownership needs to be seen as just one aspect of the business decision.

Madge believes that during the next 5 years, most enterprises will boost their business and staff mobility through the deployment of Wireless network extensions, in the same way that during the last 5 years, practically all enterprises have deployed Internet & intranet extensions.

2 Business Benefits

2.1 Mobility

Wireless provides the “invisible infrastructure” that allows staff to work wherever they need. Mobility is particularly useful in large manufacturing facilities, warehouses, chemical plants, transportation depots, airports, hospitals hotels and convention centres, as well as enterprise offices.

The advent of the laptop computer has already moved us towards this new world of flexibility and freedom. During the coming year most computer vendors have already announced their plans to build 802.11 Wireless as “standard” into their next generation enterprise laptops.

2.2 The Portable Office

The “portable office” is now defined as the place where YOU want to transact your business.

Many Business executives already benefit from the advantages of Wireless networking that is available in Wireless “Hotspots” that are now being deployed during in major hotel chains, conference centres, coffee shops and airline lounges. This provides staff with greater flexibility in access their email and the Internet, planning their meetings, and networking with their teams, customers and partners.

2.3 Saves Time: Faster Decisions and Services

Working with Wireless means continuous connections with your enterprise network as you roam the office, conference room and company rest areas. In addition, the traditional VPN can be run over public Wireless “hotspot” networks to allow busy executives to access sensitive corporate data in a completely secure way whilst away from the office on important business trips.

Other applications could include field engineers and support staff that may need to access critical information whilst working on their client premises or other sites providing Wireless access.

2.4 Improves Productivity

In a survey undertaken by the Wireless LAN Association (WLANA), it was found that the productivity benefits from Wireless networking provided 48% of the total return on investment, through workers achieving significantly more in less time. In fact, in a subsequent survey performed by NOP World-Technology, it as found that users, on average, increased productivity by 22%. When taken across the enterprise, this could have quite dramatic impacts on the “bottom-line”, and release more cash for investment in future strategic projects and ventures.

3 Financial Benefits

3.1 Criteria to be considered

Calculations of Financial Business Indices such as Total Cost of Ownership (TCO) and Return on Investment (ROI) are very much dependant on definitions, and the specific business environment in which the Wireless network is established and operated. In this white paper we'll make basic assumptions in order to compare the options of extending an existing Ethernet or Token-Ring network using a Wireless network rather than the usual wired network.

The key TCO criteria are:

- LAN Cabling Costs: Installation Labour Costs and Cables.
- Costs of 10/100 Ethernet Hubs and/or Switches.
- WLAN Infrastructure: Access Points, Cables, and Power over LAN.
- Network Management and Security Costs: Both Wired and Wireless.
- Infrastructure Costs of office moves and changes.
- Wired or Wireless Client Adapter Cards: Component & Set-Up Costs.

3.2 TCO: Wired vs. Wireless Networks

Based on the above criteria, we'll make a straightforward comparison of the TCO for Wireless networks compared with wired network extensions for 500 enterprise users on a single site.

3.2.1 Fixed Costs

- Madge Wireless LAN Equipment (and Ethernet "back-haul"):
 - 500 Madge Client Adapters (NICs) @ \$90 = \$45k (Enterprise-Grade including WLAN Utility, & all Client 802.1x Security Software)
 - 40 Access Points @ \$400 = \$16k (Enterprise Grade including SNMP/Security)
 - 40 Ethernet switch ports = \$3.2 (Assumes \$80/port)
 - 500 Device Enterprise Access Server Software Licenses @ \$80 = \$40k

TOTAL Cost of Wireless LAN Equipment = \$104.2k

- Wireless Network Installation:
 - Wireless NICs = \$12.5k (15mins/NIC @ \$100/hour IT Staff Cost)
 - Wireless APs = \$4k (60 minutes/AP @\$100/hour IT Staff Cost)
 - EAS = \$4k (Based on 5 Days @ \$800/Day IT Staff Cost)
 - Cabling to 40 Access Points @ \$100/Drop = \$4k

TOTAL Cost of Wireless Installation = \$24.5k

WIRELESS Fixed Costs: TOTAL cost of Wireless equipment & deployment is: \$128.7k

- Wired Ethernet LAN Network Extension (Equipment and Installation – 10/100Mbps):
 - Ethernet Switches and Clients = \$40k (Assumes \$80/client)
 - Cat5 Cabling and Installation Costs – 500 Clients = \$50k (\$100/client)
 - Network Management & Security = \$28k (Assume \$40/Client and 10days set-up cost)

WIRED Fixed COSTS: TOTAL initial Cost of Wired Network Extension = \$118k

3.2.2 Variable Costs

- Wired users: Costs of Network Moves and Changes:
 - Assume 25% of users move office twice each year – i.e. 50% changes/year
 - Assume Basic Cost of moving each user is ~\$100/user (wired users only)
 - Also assume ~\$5k Network Management/Server Re-configuration (each major move)

Hence annual costs of moves = $(500 * 0.5 * \$100) = \$25k$

And Network Re-Configuration (two major moves) = \$10k

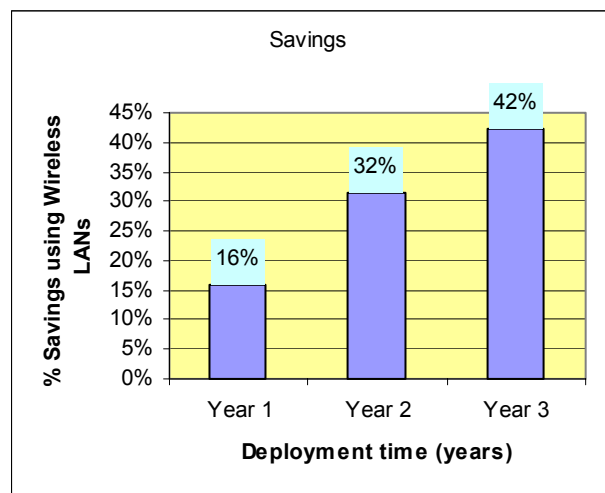
WIRED Variable Costs: TOTAL costs for Wired Network Moves/Changes = \$35k/year

- Wireless users: assume these are fully mobile so moving costs are \$0k (zero).

WIRELESS Variable Costs: TOTAL costs for Wireless Network Moves/Changes = \$0k/year

In summary, this quick analysis would suggest that Wireless Networks for ~500 users could cost around 16% less than Wired Ethernet deployment during the course of the initial 12 month period (Wireless - \$128.7k vs. Wired - \$153k). The equivalent savings after 2 years and 3 years wireless deployment increase respectively to 32% and 42% due to the relatively high cost of making moves/changes and network reconfigurations within wired networks.

In addition, the expected prices decreases in WLAN components during the coming year for Access Points and Adapters would make the TCO savings even more compelling for CIOs & IT Management.



3.3 Practical Ways Forward for your Enterprise

As stated, the above analysis is highly dependent upon the specific details of your deployment environment, regional IT labour costs, as well as the office dynamics with regards to staff moves and changes. It is suggested that you rework the above analysis with your own data to fully understand the economic benefits of Wireless deployment over a suggested 3-year period.

3.4 Wireless Return on Investment (ROI)

The greatest business impacts for Wireless LANS are the productivity benefits for staff working at *all* levels of the organisation. Intel Finance (Intel Corporation) has recently (Dec 2002) undertaken a major survey of such Wireless LAN productivity savings amongst engineering, manufacturing, sales,

marketing and support staff. The resulting ROI analysis (Net Present Value - NPV) based upon various sized buildings over 3 years are compelling:

- Small Building (32 users): Net ROI: \$280k
- Medium Building (150 users): Net ROI: \$940k
- Large Building (800 users): Net ROI: \$4,600k

For further information on the Intel Corporation study we suggest that you access the full report, which is available from the Intel web site (www.intel.com and search for 'Wireless LAN ROI').

It should be understood that these impressive ROI figures include the full cost of the Wireless equipment, installation and configuration costs, as well as operations, depreciation, taxes and the productivity savings broken out according to the size of each category within the workforce.

4 Further Wireless LAN Topics

Despite the compelling TCO and ROI financial benefits, there are still those that resist Wireless deployments due to other issues that emerged during the experiences of the early adopters of the mid to late 1990's. However, robust solutions are now available for *all* enterprise users to these issues that concerned early users.

4.1 Network Security

Madge Wireless products meet all the requirements of enterprise-grade security, as well as the US Health Care Privacy and Security needs (HIPAA). In particular, the Enterprise Access Server, Access Points and Client Adapter Software all support the most rigorous security that includes:

- 64bit/128bit WEP encryption (with Dynamic Keys as below).
- Mutual Authentication of Client and Server using IEEE 802.1x.
- Integral RADIUS and Certificate Authority within the Enterprise Access Server.
- Dynamic selection of encryption keys for each session.
- Dynamic rotation of encryption keys during the user session (e.g. every "x minutes").
- Integral Firewall and VPN Security Software within the Enterprise Access Server.

In all, Madge provides a robust 5-element security model that allows enterprise to choose which level of security they wish to implement and tailor for their specific business operations. The security hazards and Wireless "hacker threats" from the 1990s are now closed and solved for enterprise Wireless networks that are based upon the Madge Product Family.

4.2 Single or Multi-Band Wireless LANs

During the last 2 years further Wireless networking options have been defined. In 1999, users had only the choice of the 11Mbps/sec 802.11b Wireless standard working within the 2.4GHz band. However, during 2001, the higher speed option 802.11a was finally introduced with a far higher speed of 54Mbps/sec in the 5GHz band. There is also a Europeanised version of 802.11a with 2 additional features that is expected to be fully standardised as 802.11h.

This year, 2003, yet a further option 802.11g was ratified which also operates in the 2.4GHz band, and which has the attraction of being theoretically backward compatible with the slower 802.11b standard. All this can become quite daunting for the IT and purchasing departments that want to make the right decision, and yet reduce the costs, and risk of future obsolescence.

In summary:

- 802.11b: 11Mbps/Sec: 3 Simultaneous Channels available – worldwide.
- 802.11g: 54Mbps/Sec: 3 Simultaneous Channels available – worldwide.
- 802.11a: 54Mbps/Sec: 8 Simultaneous Channels available - some restrictions.
- 802.11h: 54Mbps/sec: 8 Simultaneous Channels – for European marketplace.

The Madge strategy is to:

- Design and engineer ALL Madge wireless products to industry standards.
- Ensure that the Enterprise Access Server is developed according to modular architecture.
- Develop loadable software modules to support a range of Wireless Access Points.

Madge is already shipping the Enterprise Access Server (EAS), which is 802.11a, 802.11h and 802.11g “ready”, as well as supporting a range of 802.11b Access Points today. In this way, users that choose to support the EAS Management and Security software today can be sure that their solution minimises the risk of premature obsolescence due to dynamic standards.

Madge, in common with most other leading enterprise WLAN vendors, expects customers to move from single-band/single-radio, to multi-band/multi-radio Access Points and Adapter Cards during the coming 12 to 18 months. The fact that EAS has “in-built” options to support loadable SNMP Management modules for the complete spectrum of 802.11 standards makes this a sure bet decision for CIO’s and IT Management that wish to minimise both costs and risks.

4.3 Wireless Industry Standards

The final issue that we’ve already touched upon above is that of Wireless industry standards. In addition to the 802.11 transmission/protocol standards there are various evolving standards for Wireless security, as well as inter access point Wireless roaming, quality of service, and power over LAN.

A key reason for choosing Madge is that we have strict policy and strategy only to implement and launch products once the relevant standards have been defined and ratified. In the past, some vendors have deployed proprietary standards that effectively lock you, as customers, into a closed world architecture with all the corresponding implications regarding prices & integration.

Choosing Madge, means that you buy into an “open world” of integration through industry standards such as Multi-Vendor, SNMP Management, IEEE 802.1x mutual authentication based upon robust EAP-TLS certificates and enterprise-grade scalability through LINUX software that operates on any approved INTEL based Server.

5 Summary

In summary, Madge reduces your total cost of ownership through an architecture based on industry standards that integrates all the key components (including 5 element security model, scalability and multi-vendor SNMP management) within the Enterprise Access Server.

The Enterprise Access Server (from 5 to 1000’s of users) is robustly engineered to be your secure enterprise gateway or switch between your “Wireless world” and “wired world”. In fact the breadth of features and functionality on these pioneering products is unique within the world marketplace today.