White Paper

MERU NETWORKS

# Enabling the Wireless School

## An Executive Introduction.

**There is a Growing Demand for Wireless That Works for Schools.**

Many schools are seeking new technology solutions that help optimize learning and collaboration among their students and staff, but do not have the wired infrastructure to deploy them.

They are turning to Wi-Fi to provide access to these resources, because it facilitates immediate cost effective deployment:- it is less disruptive, quicker and cheaper to deploy wireless than it is to deploy a wired network.

Wi-Fi also enables mobile applications via PDA's and Laptops and voice via wireless IP telephones and facilitates temporary deployments such as laptop trolleys and mobile classrooms. In addition it provides built in security enabling schools to allow network access for publicly owned devices

Unfortunately, the results of deployments are often disappointing, failing to deliver both on the promise of quick deployment and on the delivery of useable applications; Slow log-in, patchy availability, and poor response times can render the system un-useable as a teaching tool.

**Education Makes New Unique Demands on Wireless**

Wireless is widely and successfully deployed in schools, businesses and home environments, to provide ad-hoc access to the internet and local resources. These deployments are often deployed in a small area, for small numbers of users, downloading small amounts of data irregularly. This not what schools now need.

Schools need a wireless network that covers the whole campus and enables whole classes of pupils to quickly, simultaneously, log-in to network resources and run real time multimedia applications.

In addition the network has become mission critical (no network = no lesson) and safety critical (no network = no register).

This means the requirement is for high user densities across large areas downloading large amounts of data quickly and reliably.

**Faster, More Efficient Wireless Is Needed to Enable the Wireless Classroom**

Wireless networks are relatively slow – rated at 54Mb/s. They are also inherently in-efficient in densely populated environments. This is because they use "collision technology" to let the end devices contend for bandwidth. The more users the more inefficient the process becomes, until for a class of thirty PC's efficiency may be down to below 10%! We therefore require a step-function increase in performance to provide for the requirements of wireless classroom based education.

**Implementation and Ongoing Support Must Be Simplified.**

Deployment is one of the biggest hurdles to successfully adopting Wi-Fi in schools because an in depth knowledge of Radio Frequency theory is required to plan a pervasive deployment.

The key principles for installation of the prevalent standards of wi-fi (802.11b/ and 802.11g) are that there are three non conflicting channels on which access points can be deployed. If access points are

positioned so that they can 'see' signal from another access point on the same channel then interference occurs and coverage is either lost or compromised. This means that we must design networks with few access points positioned far apart.

But the full 54Mb/s connection is only available to devices near the access point. Devices further away receive diminishing throughput in steps down to 1Mb/s. These devices connected at low speed degrade the performance of all devices.

Networks are therefore designed around two conflicting principles.

- Access points must be close together to provide high speed access for users.
- Access points must be far apart to prevent channel interference.

To successfully design a pervasive wireless LAN detailed site surveys and channel planning, are required and the result is often a compromise.

The wireless deployment may also be modified as more users, rooms or applications are added. These changes to the design are complicated to plan, and have ripple effects on the existing deployment.

**The Challenges are Met by A Smarter, Faster Wireless Architecture and New Standards.**

A new smarter wireless LAN architecture and new faster standards address the emerging requirements for the wireless delivery of educational ICT in schools.

The new architecture puts the network infrastructure in charge of contention, rather than the wireless client. This eliminates contention inefficiencies providing a tenfold increase in performance for a class of thirty PCs. It also enables low bandwidth but time critical applications like voice to be automatically prioritized ensuring good quality even when network load is high.

It operates on a single co-ordinated channel eliminating channel interference. This means access points can be positioned on the same channel close together, removing the need for channel planning, dramatically simplifying deployment and improving performance.

The new architecture also paves the way for the simple deployment of a new wi-fi system – 802.11n. which has a raw data rate that is five times faster than its predecessor.

**Meru Networks Delivers on the Promise of Wireless ICT in Education.**

Meru is the first company to implement the new single channel / co-ordinated airspace architecture and is already delivering 802.11n. Fully compliant with the 802.11 series of standards, the Meru WLAN System, not only offers high performance and easy deployment it also provides comprehensive security and centralized management.

With some of the largest educational deployments globally, Meru Networks is leading the charge in delivering a wireless infrastructure that exceeds the wireless expectations of schools, colleges and universities.

**To Summarize**

Meru Networks offer a new wireless system which is faster and easier to deploy and enables educational establishments to wirelessly deploy ICT to pupils in classroom based learning environments.:- a wireless network that works for schools.

## Further Information

### White Papers

Many Technical White Papers are available from Meru The following papers describe their Single Channel architecture, and the new 802.11n standards.

**Air Traffic Control - The Foundation for Wireless Without Compromise™**
Meru's Air Traffic Control technology provides the foundation for what the Gartner Group has identified as the industry's visionary 4th generation WLAN solution. The differences over previous solutions are clear: application delivery is assured; performance and capacity are maximized; and deployment complexity and operations costs are minimized.

**Fulfilling the Promise of 802.11n without Compromise**
This paper offers an overview of the major benefits of 802.11n, while examining a few important deployment considerations that enterprise customers will encounter when planning migration or greenfield deployments. The effectiveness of conventional industry approaches and alternatives like Meru's Mobile SCALE solution is also explored.

### Case Studies

Example case studies follow. Case studies and reference sites are availableon request for implementations in the UK

**Northern Michigan University Deploys World's Highest Density Wireless Network**
Northern Michigan University has a long history of delivering academic excellence to the upper Midwest.Originally founded as Northern State Normal School in 1899 with a focus on educating teachers, it grew substantially in the 50's and 60's and was granted University status by the state of Michigan in 1963. The University now serves over 9600 students.

**Meru Networks Delivers Belgium's Largest Campus-Wide Wireless Network**
Wireless networks that are also VoIP-enabled are increasingly popular in dense user environments. Leveraging the WLAN infrastructure solution by Meru Networks, the Brussels Regional Informatics Centre (BRIC) on behalf of the Brussels-Capital region is now providing WLAN services across the entire Belgium's Vrije Universiteit Brussel/Universite Libre de Bruxelles campus.

### Internet

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