Meru Solution Overview

Network Computing: Meru Networks WLAN Infrastructure RFI response

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1 Architecture

The approach to design of enterprise WLAN systems varies among vendors. Enterprise IT professionals evaluating system purchase decisions often seek to gain a greater understanding of the approach taken by each vendor. Describe your overall architectural approach to enterprise WLAN solutions.

Gartner classifies Meru as a 4th Generation "traffic optimized" WLAN architecture, and most other competing WLAN vendors such as Cisco, Symbol, and Aruba as 3rd Generation "switched" WLAN architectures (the first two generations being pre-802.11 and stand-alone APs).

A switched WLAN architecture centralizes security and management, and achieves management-plane RF optimization such as channel planning and power control; traffic optimized WLAN architecture additionally coordinates channel access across APs *in the data plane* to provide application-aware over-the-air traffic differentiation and predictable service in a multi-AP WLAN.

With competing WLAN vendors, you have a trade-off between mobility and capacity. With Meru, you can cover the entire enterprise with **every channel everywhere**. Meru has uniquely figured out a way to eliminate co-channel interference and **cover the entire floor with one channel**, and layer all channels one on top of the other so that: (a) clients can live in a single channel without ever handing off, and (b) traffic can be balanced across all channels. We maximize capacity and eliminate handoff latencies – thus offering the only no-compromise WLAN solution in the industry.

In addition to next-generation over-the-air architecture, Meru offers a highly flexible and scalable network architecture designed for a wide variety of deployment environments. Meru is a L2/L3 overlay WLAN with a **plug-and-play architecture**. We support both **tunneled and bridged APs** that can be dynamically configured – for campus type and remote office deployments. Management and security is always centralized, but the data plane may be centralized or distributed. APs are "thin" in the control plane – they store no non-volatile data.

We separate concepts of physical network and virtual network. **Multiple virtual networks may be run on top of the same physical network.** Each virtual network has its own sets of policies, including security, backend integration and traffic separation (by static or dynamic VLANs), QoS, advertised rates and over-the-air configuration, and AP coverage.

APs are also air-monitors. Not only do they scan and serve, they can also be used to capture packets for remote troubleshooting. In addition to sniffed packets, alarms, and logs, traces can also be selectively enabled on the controllers and APs. Additionally, the system has the ability to take a **global "snapshot" for remote troubleshooting.**

To summarize, we have combined a technologically superior over-the-air architecture with well-engineered network architecture to present an industrial strength wireless LAN that is well equipped to handle the requirements of becoming the primary access network of the enterprise.

2 Wired-Wireless Integration

Many enterpriseIT professionals are unsure whether they should focus on a single vendor for their wired and wireless networks or if a wireless overlay solution is a better choice. Provide your perspectives on this issue. If you are a company that offers an integrated solution, please explain the benefits of this level of integration, providing specific examples wherever necessary. If you are an overlay vendor, explain the benefits of such an approach and provide reassurance to those skeptics who feel it is best to look to a single vendor for wired and wireless LAN systems.

The “integrated solution” that wired switching vendors tout for their wireless and wired switching products is slideware at best. Some customers prefer the convenience of one-stop shop while savvy customers prefer best-of-breed solutions rather than being stuck with an inferior wireless offering from a dominant enterprise wired switching vendor.

Some of the more advanced enterprises realize that the wireless edge is coming. These customers see a server cluster, a security perimeter, a wired core, and a wireless edge as the four elements of their enterprise infrastructure. This model is already in place in many verticals where mobility is a necessity and wireless is the dominant edge. For such customers, wireless and wired are primary access in different parts of the network, and tight integration is not even a point of consideration in their decision making.

3 Security

The ratification of the 802.11i standard and subsequent incorporation of this standard into the Wi-Fi Alliance’s WPA2 certification program has some in the industry concluding that enterprise WLAN security challenges have been solved. However, most enterprise IT professionals realize that WPA2 is just one part of the security problem, which a multi-layer end-to-end wireless security solution that addresses authentication, authorization, monitoring, mobility, and end-point security is required for enterprise-class WLAN systems. Explain how your solution meets these security challenges and to what degree these security services are integrated or dependent on third-party solutions.

There are three aspects to enterprise digital security:

- **Authentication and Encryption** – **validation of users and encryption of data traffic**. At the wireless L2 layer, security schemes such as 8021x/EAP-TLS/WEP, WPA/TKIP, WPA2/AES, etc. solve this problem. At Layer 3, Captive portal and VPN termination solve this problem. This aspect of security secures validated users and denies access to invalid users.
- **Authorization and Isolation** – **separation of validated users into logically distinct network segments**. Access control policies based on user, location, application (e.g. via firewalls) solve this problem. This aspect of security keeps valid users from accessing unauthorized content.
- **Intrusion Detection and Prevention** – **detection and mitigation of intruders**, **quarantining compromised devices**. Over-the-air IDS/IPS includes rogue detection and mitigation schemes, while network IDS/IPS includes searching for devices, traffic patterns, and content for compromise and containing sources of potential intrusion.

Meru provides all these aspects of digital security, plus a new dimension of security that we call “RF Layer Security”. Enabled by our unique hardware capabilities, Meru APs can scan the air on all channels and serve clients simultaneously, and mitigate rogue devices with almost zero overhead. This keeps the RF environment secure and provides wire-like physical security in addition to higher layer security mechanisms.

4 Guest access

Increasingly, IT professionals are being called on to accommodate the needs of guests who wish to gain Internet access while visiting their facilities. Providing guest access while insuring that it does not violate internal security policies or result in significant administrative overhead or inconvenience can be quite challenging. Describe the capabilities of your system facilitate guest access services.

Meru WLAN system provides several configurations and features for guest access. Meru's unique feature set ensures that guest access is available without compromising the production network of the enterprise. The features include location-specific service, separation of guest access, limited availability of network services and access to guest users, captive portal, and quarantining of suspected intruders. The guest access services are also customizable by enterprise.

5 Performance and Scalability

Many forward-looking enterprise IT professionals envision a day when wireless is the default mode of network access within their organizations. However, there are concerns that existing systems may not be scalable enough to meet these emerging needs both as relates to a campus deployment as well as a distributed deployment where wireless services need to be provided at a large number of geographic locations. Explain how your solution is capable of meeting these scalability challenges and, using metrics of total number of AP's, total physical locations, or total concurrent users, describe your largest wireless installations. You do not need to provide explicit reference to the organization, though we encourage you to provide us with such references if your customers are willing to talk to us privately.

The migration from 3rd Generation to 4th Generation WLAN architectures was driven by the need for scalable, predictable, multi-service environments. Meru is substantially differentiated from the rest of the competition. We always welcome the opportunity to have enterprise-class bake-offs where customer conduct scale trials with real data and phone devices. We have a very high win ratio in such situations, where customers are able to sift past marketing and slideware to real head-to-head comparisons.

We have the largest single channel deployment in the world (a major hospital and regional medical center), two of the largest voice deployments in the world in terms of both APs and phone density (multi billion dollar utility and construction companies); perhaps the single largest WLAN deployment (one of the nation's largest school districts), highest client density (university with all wireless classrooms), and fastest handoff times (inherent to architecture). We also have perhaps the world largest all wireless enterprise (a national utility company with 50+ offices).

6 Availability

As WLANs make the likely transition from secondary (to Ethernet) network access method to primary network access method and wireless applications begin to become more mission-critical, redundancy and high-availability become more critical elements of the enterprise WLAN purchasing decision. Explain the high-availability features offered with your product line and describe, including both system failover capabilities as well as any other features that enhance availability. Also, assess the incremental costs associated with implementing these system capabilities.

Meru's WLAN offers high availability for both the wired and wireless networks. On the wired side, we offer N+1 redundancy of the controllers. On the wireless side, we offer inherently higher over-the-air availability than any other vendor because all APs on the same channel look alike to a client, and a client can seamlessly be moved from one AP to another transparently. Further, with our ability to scan and serve simultaneously as well as mitigate rogue devices with close to zero overhead, RF capacity is both higher and assured with Meru Networks WLANs.

7 VoIP Support

The ability to support VoIP and other real-time applications are becoming increasingly important on enterprise networks. Wireless VoIP in particular has attracted significant interest, particularly in

organizations that are committed to VoIP on their wired networks or have mobile voice requirements that aren't easily or cost-effectively met using cell-phones or private two-way radio systems. Describe how your system has been designed to accommodate these needs and provide one or more examples of organizations that have implemented voice services using your system. You do not need to describe that organization by name but you should at least describe their business requirement and the scope of their installation.

Meru Networks has proven industry leadership in supporting high density voice over WLAN deployments. Key issues that need to be solved for effective voice support include pervasive coverage, over-the-air QoS, seamless mobility, support for voice and data simultaneously, management of the voice application over the WLAN such as call admission control and dynamic call-based load balancing, E911 support, and voice monitoring. Additionally, superior WLAN solutions should also have the capability to adapt voice streams to the available resources using application-layer techniques such as transcoding. Meru is the only vendor to support all these features.

Osaka Gas, **one of the largest utility companies in Japan is also the world's largest converged voice deployments**. After a thorough and very public evaluation of WLAN vendors including Cisco, NEC/Airespace and Aruba Networks, Osaka Gas selected Meru's WLAN System because of its key wireless VoIP technical advantages. Read more at:
http://www.techworld.com/mobility/news/index.cfm?NewsID=4103

8 Design and Deployment

The cost of implementing an enterprise WLAN involves not only the cost of network hardware and software, but also staff time required to design and implement the system. To address these challenges, most vendors provide capabilities to facilitate site surveys and/or develop a logical model of the WLAN prior to installation, either using integrated tools or by relying on integration with a partner's offering. Describe the design and deployment capabilities of your system and provide an example of an installation where a customer has benefited from these services.

The micro-cell approach for RF planning does not work well. It is much easier, and much more cost effective, to blanket the floor with one or more channels (so that there is no trade-off in terms of cost or capacity or mobility) than it is to try to manually or automatically optimize channel and power plans.

When a customer requires predictable service in dense environments, other WLAN vendors require complex planning, often without success. This is because they hit the limitations of their architectural approach – micro-cells simply don't work well and they run counter to the basic premise of 802.11 carrier sense anyways. Meru has gone into customer situations where one of the other WLAN vendors has spent days trying to optimize the network with complex RF surveys and specialized antennas etc. and failed – and Meru has been able to deploy the network in a matter of hours with generic equipment and antennas where others failed after many days.

Meru recommends a very simple coverage model for customers. Meru also provides a comprehensive E(z)RF coverage Planner and site survey tool. This tool provides a comprehensive planning tool for those customers who want to deploy the network based on their specific preferences. Once installed, the WLAN system auto discovers and auto configures for voice and data services.

9 Monitoring and Management

As enterprise WLANs expand from tactical hotspot installations to pervasive deployments, the monitoring and management capabilities become increasingly important, in facilitating

deployment, enforcing policy and compliance, solving service problems, and proactively addressing capacity and performance issues. Describe your monitoring and management capabilities, making explicit reference to how your system meets the management and operational needs of users, help-desk staff, network engineers, and IT managers.

Meru provides multiple options for monitoring and management including CLI and GUI in the controller, and management/monitoring in a central EzRF management tool. The GUI offers the ability to monitor and configure all aspects of the system via a simple point and click interface. The CLI is very flexible. SNMP interfaces as well as logging capabilities allow for integration with 3rd party systems. Monitoring information includes a dashboard with details of the RF medium, wired medium, virtual networks, devices, applications, and indeed every aspect of the system. APs are also air monitors. Meru's E(z)RF Application Suite is a complete management and monitoring platform that enables monitoring, configuration & management of multiple controllers, real-time visualization of WLAN and also locationing features. The E(z)RF Application Suite platform extends management functionality to thousands of APs for the largest enterprise deployments. The system is server based, offering a graphical user interface that is easy to use placing all system linkages "in context" for efficient workflow by network engineers, operational users and IT managers. Functionality includes monitoring and configuration of multiple controllers in both network and geographic contexts. The E(z)RF system increases the tools available to network engineers by offering RF visualization to aid in problem isolation and troubleshooting of coverage and performance issues. Locationing offers functionality to locate Rogue APs, clients and WiFi tags with APIs for integration to location applications used in specific vertical markets. The system also includes alarms with notification, reporting, trending, assignable user roles/privileges and syslog /SNMP support. Different types of user like help-desk staff, network engineers and administrators have different levels of access and privileges on the system to carry out varied levels of management and monitoring tasks.

10 Advanced Services

While all enterprise WLAN systems are expected to provide basic network access services, some vendors are developing specialized capabilities, including location services and asset tracking, to enhance their system offerings. Describe any unique capabilities or services found on your system that your customers have found important in making their system purchase decisions.

Meru offers advanced services including the voice services module, the security services module, E(z)RF management system, etc. The Voice Services Module offers advanced voice optimization and management features. The Security Services Module offers advanced security features including IDS/IPS and RF signal level security. The E(z)RF management system provides highly scalable management and monitoring for several thousand APs as well as advanced diagnostic, location, and application plug-in capabilities.

Meru's customers realize the benefits of simple pervasive WLAN deployment and the importance of predictability of service as wireless becomes an increasingly used access medium. Our customers pick us because they enjoy the benefits of centralized management, strong wired and wireless security, predictable service, support for multi-service applications including voice as a primary application, seamless mobility, high performance, and most importantly, a scalable standards-based solution that is most easily extensible to emerging architectures.

11 Cost

The tables below shows list price for our range of products

Product	**Price range per Unit ***	**Description**
Access Point	$ 445 to $795	Price varies based on number of different models of APs
Meru controller	$ 1795 to $ 36995	Price varies based on number of APs per controller
Radio Switch	$ 1695	Price includes special wideband antenna.

* Rogue detection and mitigation functionality, basic security, web-based management, and AP wall/ceiling mounting hardware is included in the above prices.