Sugestões e solicitações de alterações para Consulta Pública Nº 01/2020

Qua, 17/06/2020 18:06

Para: NULIT-TRF1-Núcleo de Licitações <nulit@trf1.jus.br>

📎 1 anexos (4 MB)

Mist-Overview.zip;

vem respeitosamente, apresentar sugestões e alterações a Minuta de Edital, abaixo, conforme orientado pelo Aviso de Consulta Pública Nº 01/2020, referente ao fornecimento de solução de rede sem fio, com assistência técnica pelo período de 60 (sessenta) meses e serviço de implantação, instalação configuração e treinamento, para atender as necessidades do Tribunal Regional Federal da 1ª Região - TRF1.

Sugestões e Alterações:

Item 1.4   solicitamos acrescentar:

*1.4. Permi. r instalação em ambiente virtual VMWare ESXi 6.0 ou superior. **A plataforma de Wireless LAN ,controle e gerência também poderá ser entregue na nuvem pública**.*

Item 1.7   solicitamos alterar:

*1.7. As licenças deverão ser de caráter permanente quando a entrega for por modelo de compra, por tempo indeterminado, permi ndo que todas as funcionalidades e caracterís cas da solução de rede sem fio estejam operantes mesmo após a vigência do contrato ou garan a da solução. **Para modelo de serviço em nuvem as opções de subscrição devem atender o licenciamento de 1, 3 e 5 anos pelo menos**.*

Item 2.9   solicitamos incluir

*2.9. O Equipamento de ponto de acesso sem fio deverá atender aos padrões IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n e IEEE 802.11ac (compa vel com padrão wave 2), com configuração via so ware e **suporte a 802.11ax (Wi-Fi 6).***

Item 2.14   solicitamos incluir

*2.15. Possuir antenas compa veis com as frequências de rádio dos padrões IEEE 802.11a/b/g/n/ac (wave 2com padrão de irradiação omnidirecional **e suporte a 802.11ax.***

     Solicitamos re rar ou apresentar após assinatura do contrato o item abaixo:

2.2. Possuir cer ficado emi do pelo "WIFI Alliance" na categoria de Enterprise Access Point;

O cer ficado não está disponível. Em virtude do COVID-19, encontra-se atrasado.

Solicitamos alterar o item abaixo:

2.29. Possuir padrão WMM da Wi-Fi Alliance para priorização de tráfego, suportando aplicações em tempo real, tais como VoIP e vídeo

Sugestão:

2.29. Possuir a funcionalidade de QoS para priorização de tráfego, suportando aplicações em tempo real, tais como VoIP e vídeo

Item 2.34   solicitamos incluir

*2.34. Possuir, no mínimo, 1 (uma) interfaces 10/100/1000BaseT Ethernet, auto-sensing, auto MDI/MDX, com conector RJ-45, para conexão com a rede local- LAN, **e Bluetooth LE integrado sem a necessidade de baterias.***

Solicitamos alterar o item abaixo:

2.37. Possuir, em conjunto com o so ware de gerência ou controladora rede sem fio (WLAN) especificado no item 01 e 04, padrões abertos de gerência de rede SNMPv2c e SNMPv3, incluindo a geração de traps ou RestFull APIs;

Para: 2.37. Possuir, em conjunto com o so ware de gerência ou controladora rede sem fio (WLAN) especificado no item 01 e 04, padrões abertos de gerência de rede SNMPv2c e SNMPv3, incluindo a geração de traps ou RestFull APIs ou suportar o monitoramento da solução através de uma solução de inteligência Ar ficial com APIs disponíveis.

A Solução MIST da Juniper é baseada em Inteligência Ar ficial, fornecendo todos os detalhes da rede, incluindo o monitoramento de uma forma intui va e de fácil interpretação, tornado o protocolo SNMP sem qualquer u lidade.

Gostaríamos de incluir:

A solução deve possuir na vamente aplicação de controle de a vos,

A solução deve permi r o uso da facilidade de localização de um usuário através de aplica vo smartphone e disposi vos wireless tal como ajuda na navegação para ambiente indoors e envio de mensagens para um usuário quando próximo de determinado local.

<u>Obs: A parte em negrito são as sugestões</u>

Em anexo, encontram-se os catálogos da solução da Juniper.

MIST MARVIS OVERVIEW

The Virtual Network, known as Marvis, is an AI-driven network assistance service for helpdesk staff and network administrators. It enables the future of helpdesk operations with simplified troubleshooting and network performance analysis. Simply ask a question—"Why is Bob's Wi-Fi slow today?"—to get answers to complex questions. As IT transforms towards a self-driving network, Marvis takes proactive measures by and offering driver-assist features to keep the network running seamlessly.

Per Client Service Level Expectations

Complementing Mist's two assurance services, Marvis provides continuous behavioral analytics and network traffic analysis to each client using machine learning. Having the ability to track clients and their trends gives IT deeper insights for trouble shooting and planning.

More importantly, Mist's open API framework can trigger automated workflows so you can rapidly solve wired, wireless and device problems.

Get Insights and Troubleshoot by Asking Marvis Questions

With Marvis' Natural Language Processing interface, troubleshooting is accelerated by eliminating the need to pull up multiple dashboards or issue numerous CLI that are warranted from today's competing solutions. And getting insights into how the network or endpoints are performing is simplified, helping you better understand your environment.

Simply ask the system how many endpoints of a certain type/OS are connected, giving you insights into your employee and guest BYOD devices to help in support or development planning. Marvis, which can possibly answer network health questions faster than a person, is like having a virtual network expert on your team who combs through the data and logs to determine root causes of issues.

Proactive Anomaly Detection

Marvis adds anomaly detection to the Mist SLE dashboard so that administrators can rapidly identify services impacting events and, then quickly identify and resolve the root cause of issues. Anomaly detection leverages data science tools to automatically determine service baselines and trigger notifications when there is a service-impacting deviation from that baseline. With our API driven interface, detected anomalies can even trigger external events such as creation of a help desk ticket, without manual intervention.

Multivendor Wired Switch Health

Delivers health statistics through Marvis with Mist access points for multivendor switches including:

• Version compliance for switches running dissimilar hardware
• Switch-AP affinity shows how many APs are connected to a switch, reducing impact outages
• PoE compliance
• Inactive or missing wired VLANs that are misconfigured on switch ports where APs are connected but clients are getting blocked

Note: the VNA service requires that you also subscribe to to either the Wi-Fi Assurance or Wired Assurance base licenses.

Marvis Actions

It brings Marvis AI-engine's transformational concept of the self-driving network to IT teams. It identifies issues across IT domains (WLAN, LAN, WAN and Security) and turns them into human actions to resolve most issues.

For Wired Assurance, Marvis Actions automatically adds missing VLAN tags, fixes incorrect port mode configuration settings, or identifies bad network cables.

For Wi-Fi Assurance, Marvis Actions helps track and manage firmware upgrades and EAP/802.1x authentication failures.

Marvis Actions performs self-driving actions by identifying identifying the root cause wired and wireless problems and making automatic fixes when possible. For connected systems outside the Mist domain, it will recommend actions with high efficacy for administrators (akin to driver-assist mode) along with a real-time network health dashboard that reports issues from configuration to troubleshooting.
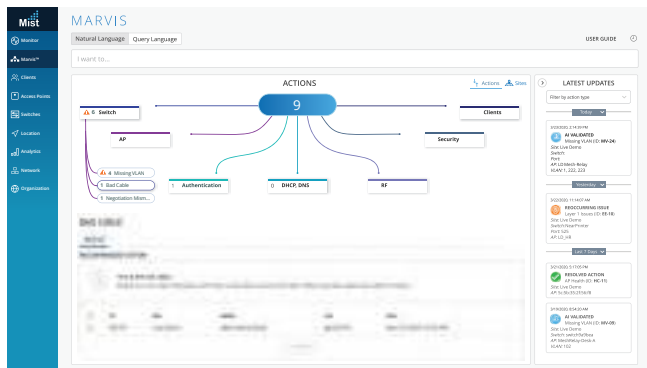
Note: the VNA service requires that you also subscribe to to either the Wi-Fi Assurance or Wired Assurance base licenses.

Mist Premium Analytics

Accelerate Your Digital Transformation with End-to-End Visibility and Business Insights

Enterprises are rapidly modernizing their IT to support the various initiatives to enable digital transformation. Implementing the latest connected enterprise with service robots, enabling remote access capabilities and supporting business re-openings with new social norms, and gathering end-user insights for their multi-channel retail campaigns, networking teams are overwhelmed by these growing demands. Ultimately, for networking teams, digital transformation is now an ongoing priority.

CHALLENGE

In supporting their company's digital transformation initiatives, today's enterprise networking teams are constantly running on a treadmill of sorting through multiple monitoring systems to track the performance of different applications, services, systems and networks, whether they are on-premises, in the cloud or both. No matter where they are in their digital journey, networking teams have realized the following challenges:

- Access to data is kept in silos, whether across disparate systems or organizations
- Filtering and accessing analytics via legacy systems today are costly, slow, and inefficient
- Absence of rapid and actionable network business insights

SOLUTION

With Mist's Premium Analytics Service, enterprises can get benefits of the network IQ to succeed in their digital transformation journey. It offers end-to-end network visibility and unique data driven insights to help networking teams accelerate their enterprise's digital journey. Mist customers, who are using the built-in analytics service that provides historical reporting for up to 30 days of data, can now also benefit from this new complementary subscription to view their network throughput peaks or identify repeat visitors (customer or employee) to properly align their support resources (on-demand assistance or support public safety). To extend these capabilities to 3rd party network elements, data consumption term up to 12 months or longer, specialized solutions like user journey mapping or proximity tracing, along with the option to generate customized reports, the Mist Premium Analytics service is available as a subscription.

Networking Insights

To ensure IT assets and controls meet the business expectations for your digital business, end-to-end network visibility, continuous monitoring and actionable insights are critical. This involves not only identifying network infrastructure misconfigurations and issues, but also addressing deficiencies impacting applications, end users and clients. As a Mist Wired or Wireless Assurance subscriber, networking teams have the networking insights to effectively identify and solve sub-par experiences for their end-users and clients, as it pertains to the Mist Cloud managed network. Other customers utilize client and traffic utilization insights for better planning, resource management and public safety. Customers, who have multivendor network stacks and require end-to-end visibility on traffic utilization, application performance, network health, can now benefit from Mist Premium Analytics service. Here are some sample networking use cases:

- Monitoring and Behavior Reports for Applications and Clients
- WAN Visibility for Link QoE and Application QoE
- Ingestion and reporting from Juniper and other 3rd Party Network Devices (not managed by Mist Cloud)

Engagement Insights

For leading enterprises, customer or employee engagement has become a top priority with their digital transformation initiatives. Whether analyzing retail traffic flows and space utilization in the carpeted enterprise, optimizing staff operations, or real time reporting on congested areas, enterprises from different verticals want network data insights to drive decisions around staffing, product and services placement, real estate planning and proximity tracing. By leveraging Mist's location services[1], both built-in to the platform and through our complementary technology partnerships, Mist Premium Analytics enables networking teams fast access to business insights that support requested analytics on customers and guests. Enterprises, who choose to segment their end users and subscribe to Mist's User Engagement or Asset Visibility services, will see areas where customers visit and drive more interactions with associates and customers, leading to higher basket size. Retailers are seeking digital platforms that provide data insights to support industry best practices like cross-selling and omni-channel initiatives or day-to-day practices like social distancing. To learn more about Mist's business continuity use cases that support new social practices at work, please visit https://www.mist.com/contact-tracing/. Popular engagement analytics use cases include:

- Visitor Segmentation and Trends with Dynamic Categorizations
- Unique Visitor Trends with Popular Motion Flows for User Journey Mapping and Proximity Tracing.
- Ingestion and Customized Reporting with 3rd Party Data

---

[1] Mist User Engagement and Mist Asset Visibility are the location services subscriptions from Mist Systems.

NETWORK IT USE CASES

NETWORK ANALYTICS
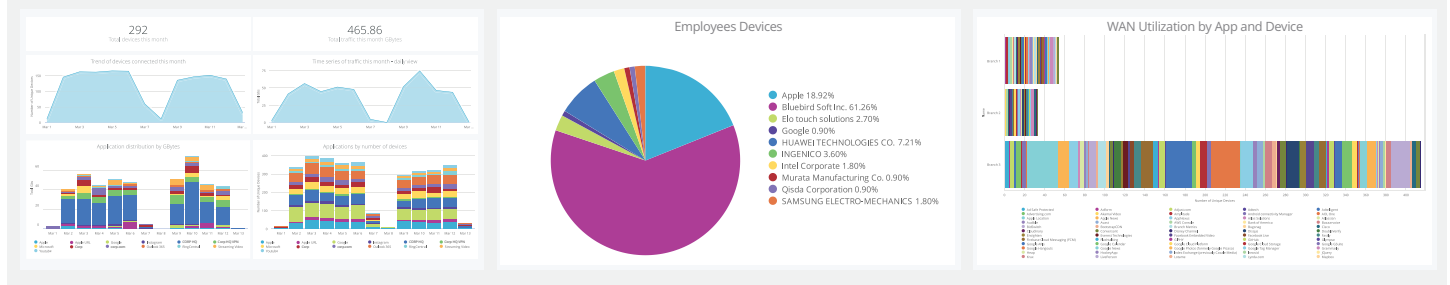
Network Analytics	Basic	Premium Analytics
Networks Insights on Wired and Wireless	Y	Y
Security Insights – Rogues and Honeypots	Y	Y
Client Connections – Trends and Counts	Y	Y
Application Visibility from Mist Wireless	Y	Y
Queries (Rank, List, Trend and Count)	Y	Y
Custom Queries – e.g. Unique Devices on Multiple WLANs – Trend and Counts		Y
WAN Visibility for Link QoE and Application QoE		Y
Ingestion and Reporting from Juniper Network Devices (not managed by Mist Cloud)		Y
Ingestion and Reporting from 3rd Party Network Devices (not managed by Mist Cloud)		Y

LINE OF BUSINESS USE CASES

ENGAGEMENT ANALYTICS
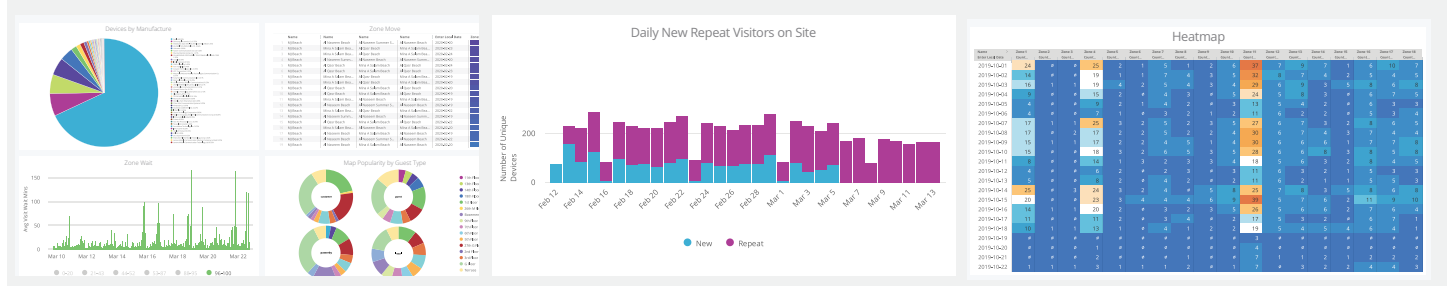
Engagement Analytics	Basic	Premium Analytics
Visitor Segmentation and Reporting – Based on User Defined Dwell Times	Y	Y
Dwell Time – Trends and Averages for Pre-defined Labels for Visitor Segmentation	Y	Y
Unique Visitor Trends – Based on Pre-defined Labels for Visitor Segmentation	Y	Y
Dwell and Visits Per Site, Floor and Department	Y	Y
Visitor Segmentation Between New and Repeat Based on a Fixed 7 Day Rolling Window	Y	Y
Heatmaps – Real Time and Historical Replay and Visits and Dwell	Y	Y
Visitor Segmentation Between New and Repeat Based on Flexible and Configurable Time Duration		Y
Support Proximity Tracing and User Journey Solutions		Y
Data Segmentation and Reporting Based on Dynamic Aggregation of Dwell Times for Visitor Segmentation		Y
Dwell Time – Trends and Averages for Dynamically Defined Labels for Visitor Segmentation		Y
Unique Visitor Trends Based on Dynamically Defined Labels for Visitor Segmentation		Y
Ability to Re-process Historical Data Sets – Based on Changes in Criteria		Y
Popular Motion Paths – Traffic Flows Between Zones		Y
Ingestion and Reporting with Location and 3rd Party Data (Sentiment, Weather, PoS, etc.)		Y

Bringing Artificial Intelligence to Wireless Networking

THE JOURNEY TO A VIRTUAL WIRELESS ASSISTANT

Bringing Artificial Intelligence to Wireless Networking

THE JOURNEY TO A VIRTUAL WIRELESS ASSISTANT

For centuries, new technologies have ushered in entirely new eras of progressive change in all facets of life, and have revolutionized countless industries. The invention of the steam engine brought about the industrial revolution and expanded trade and transportation. Quantum physics was the foundation of the electronics revolution that brought us transistors, TV, radio, and computers. And the Internet has brought about a stunning information and communication revolution, which is still sending shock waves across virtually every industry, and to the very core of our cultures and lifestyles.

Many pundits predict that Artificial Intelligence (A.I.) is the next big "game changing" technology, poised to impact virtually every facet of our lives in the coming years. According to Gartner Inc., by 2020, A.I. technologies will be virtually pervasive in almost every new software product and service, and A.I. will be a top five investment priority for more than 30 percent of CIOs.

In the world of wireless networking, A.I. is already showing enormous value. The Mist Learning WLAN uses machine learning and neural networks to simplify operations, expedite troubleshooting, and provide unprecedented visibility into the user experience. But we are just on the cusp of its true potential, with the promise of a true virtual wireless assistant right around the corner that can proactively identify and fix problems and predict future events quickly and reliably.

How do you take advantage of A.I. in wireless networking today, and what steps should you be taking to position yourselves for this emerging world? Let us show you how. Below is an overview of how we are leveraging A.I., what it takes to build an AI-driven WLAN, and what this technology can do for your business.

WHY IS A.I. TAKING OFF NOW?

A.I. technology has been studied in research labs and universities for many years, but only recently has A.I. found its place in practical applications due to advancements in computing power, big data, and open source technologies.

Modern Cloud Compute
Even though neural networks and machine learning concepts have been around since the 1950s, the modern cloud did not emerge until the mid-2000's when the compute power needed to solve large computational problems became available. Cloud infrastructures like Amazon AWS, Google Cloud, and Microsoft Azure have turned A.I. into a mass market technology by pricing compute cost effectively (with elastic growth), enabling companies of all sizes to quickly and cost-effectively build A.I. platforms on massively scalable and secure global cloud infrastructures.

Additionally, these cloud platforms leverage distributed micro services API architectures, which allow services to be updated more quickly than traditional embedded software architectures and without disruption to existing services. This gives businesses a competitive advantage and lets IT focus precious resources on strategic projects.

Big Data
Highly scalable and cost effective storage is a second factor in the mass adoption of A.I.   A Gigabyte (GB) of storage in the cloud costs as little as $0.005 / month, allowing huge amounts of unstructured
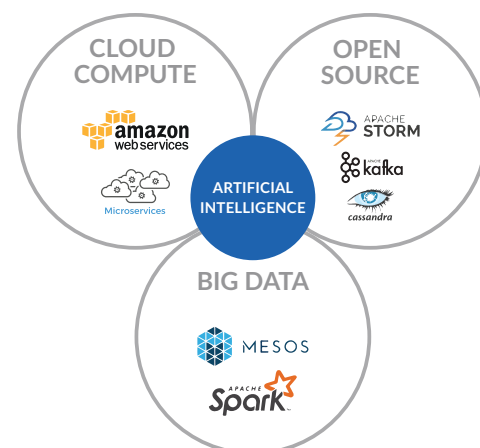
data to be stored cost effectively. In addition, big data platforms like Spark (developed at Berkeley's Algorithms, Machines, and People Lab) are allowing programmers to work with almost infinitely large data sets that expand well beyond the capacities of a single server. By combining these large datasets with machine learning techniques, a new and exciting discipline has emerged called computational science that allows companies to solve complex problems, like predicting genetic diseases, forecasting financial markets, and processing terabytes of wireless data.

Open Source Technologies
LinkedIn, Facebook and other large companies have invested tens of millions of dollars in software that was subsequently opened up to the masses for constructing powerful applications, systems, and services. This open source software, created specifically for massively distributed cloud services, allows companies of all sizes to cost effectively build extremely scalable A.I. platforms.

Cassandra is an example of best-of-breed open source software. It allows anyone to deploy a proven fault-tolerant database in the cloud that is capable of storing enormous amounts of data with full resiliency. Similarly, Spark is open source software that allows data to be distributed over a cluster of fault-tolerant machines while leveraging distributed shared memory. Storm, another open source software solution, is a distributed stream processing computation framework that uses custom created "spouts" and "bolts" to define information sources and manipulations for the batch processing of distributed streaming data.

When choosing an A.I. vendor for wireless, make sure to take a look at what is under the hood.

WHY CIOS SHOULD EMBRACE A.I. IN THEIR WIRELESS STRATEGY

Wireless networking is at an inflection point whereby the traditional way of deploying, operating and managing Wi-Fi networks won't suffice anymore. More specifically, there are three fundamental market transitions occurring in wireless networking today that are making A.I. an indispensable necessity.

First, Wi-Fi is increasingly becoming the primary Internet access technology. It is more business critical than ever and therefore has to be more predictable, reliable, and measurable than ever. At the same time, it is harder than ever to troubleshoot wireless given the myriad of mobile device types, applications, and operating systems, coupled with the sheer quantity of mobile users and wireless enabled IoT devices. This transition requires better visibility into the mobile user's end-to-end experience, and it creates a need for new automated management tools that replace manual, mundane tasks with automation, proactive insight and full programmability.

Second, mobile users are becoming accustomed to personalized wireless services on their mobile devices that leverage contextual information, like location. And companies see location as a key way to bring value to business operations through better customer/ employee/guest engagement and new insight into mobile user behavior (i.e. analytics.) Bluetooth® Low Energy is emerging as the interoperable industry standard for indoor location, having been accepted and embraced by all major smart phone manufacturers (e.g. Apple supports iBeacon and Google supports Eddystone). However, large scale Bluetooth®LE deployments are being held back by the need for an overlay network of battery beacons. This is changing, however, with the virtualization of beacons, usage of machine learning for calibration and accuracy, and convergence of BLE and Wi-Fi, which eliminates the need for an overlay network. As a result, BLE and indoor location is moving from a nice-to-have to a must-have capability.

Third, enterprises are moving IT support for sales, HR, and finance to managed cloud services to get better efficiency and to allow internal IT skills to be better aligned with the core business. Even security, storage, and other key infrastructure elements are rapidly being transitioned to the cloud. Wireless networks, however, have been slower to adopt this transition, with more than 90% of the WLAN market still delivered via on premise controllers. Moving wireless to the cloud gives CIOs a more scalable and resilient infrastructure with better operational simplicity. In addition, it gives CMOs and business owners actionable insight from the petabytes of data flowing through wireless networks today. This is why cloud wireless is the fastest growing segment of network IT, with 1/3 of the total market expected to transition to the cloud by 2020 (IDC).

Wireless Networking Needs A.I.

THE EVOLUTION OF IT TO DEVOPS	CONVERGENCE OF WI-FI AND BLUETOOTH LE	SHIFT TO MANAGED SERVICES VIA CLOUD

APIs
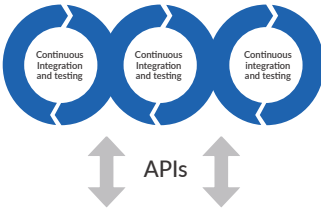
- API- first
- Real-time cloud
- Distributed software architecture

Indoor location is now a "must have"

- Way finding
- Push notification
- Resource allocation
- Asset tracking

Wireless is last man standing

Startup companies have always been the driving force of disruptive innovation in market transitions. In wireless, for example, we saw it with the transition from autonomous APs to controller architectures, which was championed by new companies like Airespace (now Cisco) and Aruba (now HPE). This phenomenon will see itself repeated with the move to AI-driven networking. Large legacy networking companies cannot start with a blank sheet of paper and bring about an A.I. led paradigm shift into the market, because they are encumbered by existing investments in legacy solutions. Furthermore, they lack domain expertise and have resources split amongst many different silos of products. This has created a vacuum for a new wireless vendor – i.e. Mist - to lead the wireless industry into the next phase of technology adoption, driven by A.I.

MIST – THE NEW WIRELESS NETWORK

Mist built the first AI-driven wireless platform, designed specifically for the smart device era. The Mist Learning Wireless LAN makes Wi-Fi predictable, reliable and measurable by providing unprecedented visibility into the user experience and by replacing time-consuming manual IT tasks with proactive automation. In addition, Mist is the first vendor to bring Enterprise grade Wi-Fi, BLE and IoT together to deliver personalized, location-based wireless services without requiring battery-powered beacons. All operations are managed via Mist's modern cloud architecture for maximum scalability, agility, and performance.

The Mist team is ideally suited for bringing A.I. to wireless networking. We have combined data scientists and cloud architects with decades of wireless domain expertise to build the first truly innovative WLAN platform in over a decade.

At the core of our solution is the Mist cloud, purpose-built on a micro services architecture for rapid deployment of new services without impacting existing services. The Mist cloud uses the latest proven cloud technologies for message handling, data storage, and real time data processing. In addition, everything is open and 100%
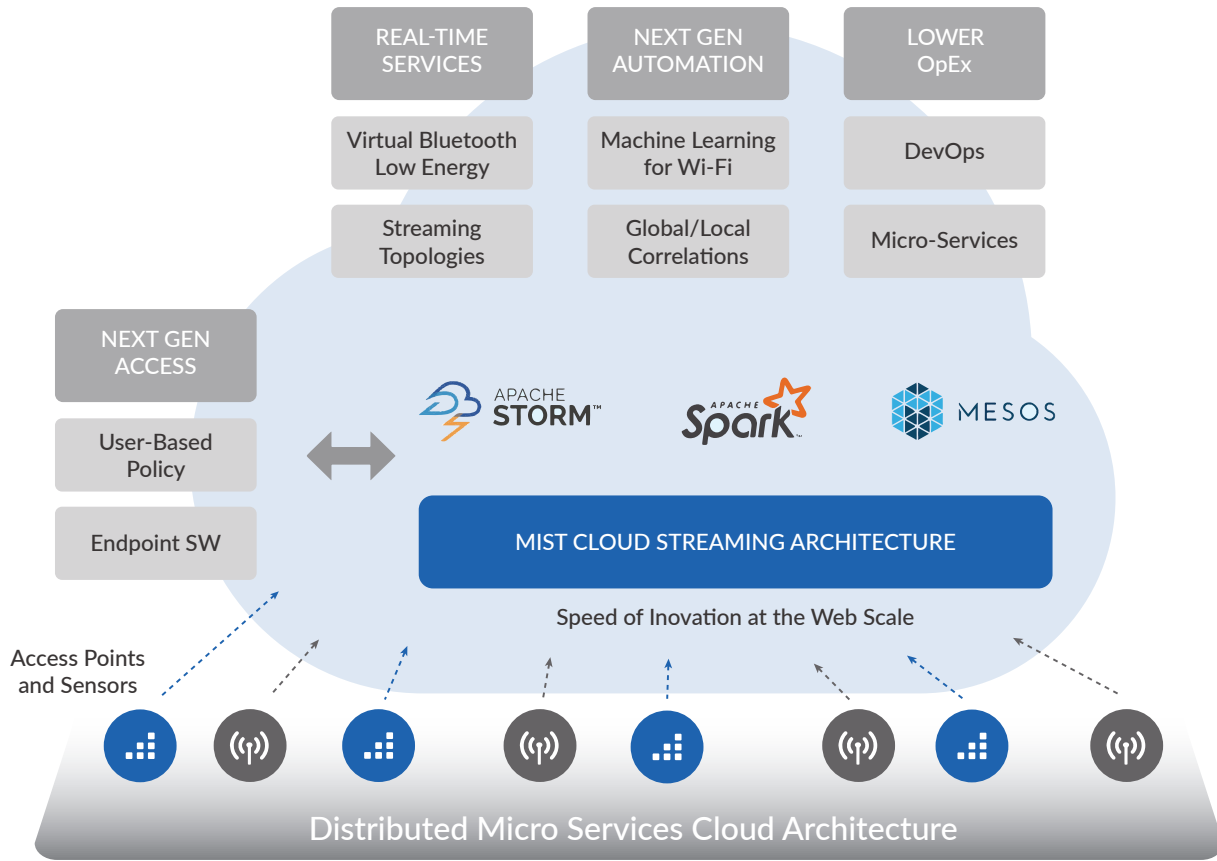
The Mist Learning WLAN

Distributed Micro Services Cloud Architecture

programmable via APIs for maximum flexibility. This gives CIOs the speed of innovation they need to compete in a globally mobile world that is moving at an ever increasing pace.

The Mist cloud architecture provides a solid foundation for real-time A.I.-driven wireless operations. An enormous amount of data can be ingested and processed in real time, which allows unprecedented visibility into user behavior and simplifies operations through event correlation, baselining and anomaly detection. In addition, it lets the Mist network predict user problems before they happen.

It is worth noting that not all clouds are created equal. The first generation wireless clouds are merely virtual WLAN controllers stored in distributed data centers. While they simplify deployment and management, they do not fundamentally change the software architecture, and thus do not provide elastic scale and the performance, agility, and resiliency of the Mist cloud. In addition, and perhaps most importantly, they are not capable of supporting all of the features critical to an A.I.-driven WLAN, which include:

- Data collection
- Data measurement using domain specific metrics

The Foundation of an A.I. Driven WLAN

| Data | Measurement Domain Specific Labels | Data Science | Virtual Assistance |
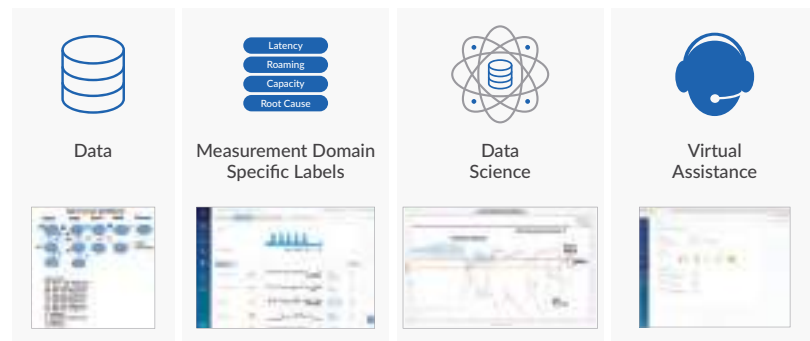
Over 100 Pre and Post Connection States Tracked in real-Time

- Data pipeline to support an evolving toolbox of data science algorithms
- Virtual wireless assistant

Data collection

Just as all great wines start with great grapes, any meaningful A.I. solution begins with massive amounts of quality data. A.I. continually builds its intelligence over time through data collection and analysis, so the more diverse data that is collected, the smarter it gets.

The Mist platform has a unique Proactive Analytics and Correlation Engine (PACE), which provides the foundation for A.I. data collection and analysis in the Wi-Fi / BLE domain. PACE collects over 100 pre- and post- connection user and location states in near real-time from every wireless device. This state information is sent to the Mist cloud, where A.I. algorithms are used for real-time analysis.

Enterprise business who are embracing BLE and mobile apps into their wireless strategy are also bringing data from the mobile device to deliver on high-accuracy location services to enable contextual services.

Mist's architecture allows for the capacity and performance to aggregate global metadata across customers. Not only is Mist capable of collecting data for insight into a specific client behavior and location information, it can provide insights and analytics across device types, operating systems, applications, and more. This is key for baselining and monitoring trends, and identifying macro issues early so they can be addressed proactively.
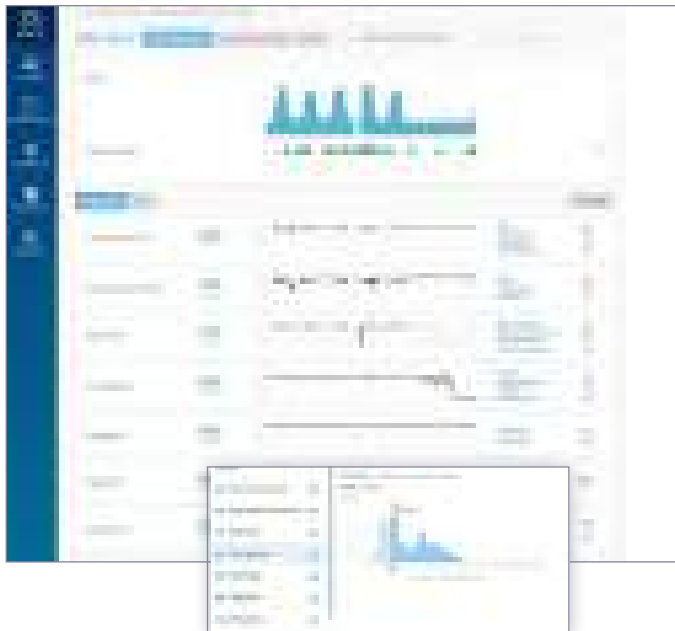

Domain Specific Design Intent Metrics

Whether trying to build a system that can play Jeopardy, help a doctor diagnose cancer, or help an IT administrator diagnose wireless problems, all A.I. solutions need labeled data based on domain specific knowledge to break the problem down into small segments that can be used to train the A.I. models.

In the Mist environment, this is achieved using design intent metrics, which are structured data categories created by Mist's domain experts to classify and monitor the wireless user experience.

For example, Mist lets you set, monitor, and enforce your own Service Level Expectations (SLE) for various key Wi-Fi metrics such as "Time to Connect", "Successful Connections", "Throughput", "Coverage", "Capacity", "Roaming" and "AP uptime". These are then used to quantify the Wi-Fi performance of clients, Access Points, and entire locations. For example, you can define a throughput SLE of 30 Mbps for all users in your main campus. PACE will tell you exactly what percentage of the time this SLE is being hit, which users are not getting this level of service, and which device types/operating systems/applications are consistently causing problems. In addition, it can predict if this SLE will be achieved in the future based on current conditions.

Mist has similar metrics that are also applicable to the location experience, such as "Location Latency", "Jitter", "Dropped Requests", and "AP uptime". With Mist, you can use Wi-Fi and BLE metrics together to deliver the best wireless services with confidence – i.e. the
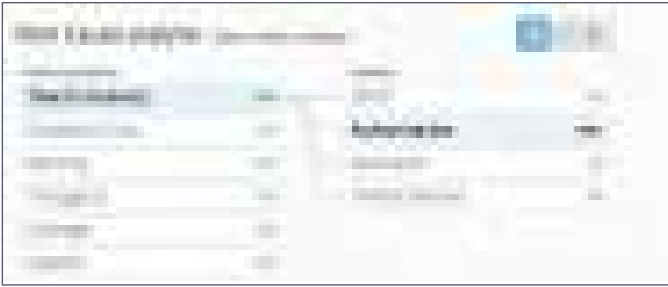
user experience is completely measurable. In this respect, Mist is fundamentally changing the paradigm in wireless networking from managing wireless Access Points to managing the end-to-end user experience.

Data Science Toolbox
Now that the problem is divided into domain-specific chunks of metadata, this metadata is ready to be fed into the powerful world of machine learning and big data. Mist uses various techniques, such as supervised / unsupervised machine learning and neural networks, to analyze data and provide actionable insight.

For example, the Mist platform performs time series anomaly detection with event correlation to identify the root cause of Wi-Fi and BLE problems so remediation can happen quickly. The 100+ state metrics listed above are analyzed for anomalies and correlated to identify problems in the wireless, wired and device domains (e.g. device type, operating systems, access point, DHCP server, Authentication server, DNS latency etc.) For example, an abrupt failure when onboarding a mobile device can be traced back to an association, authentication, DHCP, or other pre- and post- connection factors.

In addition, Mist identifies if temporal events, such as improper change control or Radio Resource Management (RRM) adjustments, contributed to a poor wireless experience. For example, if a network administrator changed a configuration at 3:00am that caused connection times to increase, the Mist platform will trigger an anomaly and correlate it back to the configuration change for rapid troubleshooting and remediation.

For location, Mist also has unsupervised machine learning algorithms in the tool box to calculate changing path loss models for all mobile devices in real-time. This eliminates the need for manual calibration of BLE, which is one of the largest operational costs that have hindered the deployment of indoor location services to date. In addition, it provides a more consistent and reliable user experience across various mobile device types.

In addition, Mist uses A.I. for security behavior analytics. Unlike traditional vendors, the Mist platform maintains a state machine and a baseline on key metrics for every physical device (access point, clients) and logical entity (location, site, site-groups) that complements flow information and a rich elastic cloud data store. By detecting unusual network activity at every level of the network, the Mist platform can accurately detect existing and day-zero threats. In addition, Mist's accurate location technology can be used to accurately locate accidental or malicious rogue devices and provide location-based access to resources.

In a traditional WLAN environment, raw data is placed into an unstructured database, where the data must be analyzed by a domain expert. Mist, on the other hand, uses a data science toolbox that automates the process and delivers a higher degree of accuracy in a shorter period of time.

Virtual Wireless Assistant
Most people experience collaborative filtering when they pick a movie on Netflix or buy something from Amazon and receive recommendations for other similar movies or items. Beyond recommendations, collaborative filtering is also used to sort through large sets of data and put a face on an A.I. solution.

Mist uses this methodology to turn all the data collection and analysis into meaningful insight or action. It is akin to a virtual wireless expert that helps solve complex problems.

The Mist virtual wireless assistant combines quality data, domain expertise, and syntax (metrics, classifiers, root causes, correlations, and ranking) to provide predictive recommendations on how to avoid problems and actionable insights on how to remediate existing issues. Mist allows human creativity and intelligence to intervene and provide feedback on the correctness of the recommendations to train the Mist expert system.

With the proper "education", the Mist virtual A.I. assistant will learn wireless network nuances, and be able to respond to questions like "what went wrong?" and "why did that happen?". The framework also allows Mist to extend its Virtual Assistant to more predictive "What-If?" scenario analysis. For example, if an enterprise plans to roll out a new application or new client devices, the Mist platform can provide an impact assessment on the current network. Or if a Retailer plans to expand beyond its current footprint, Mist can provide capacity planning guidance based on current network performance.

Remember, we said the more data collected, the more intelligent A.I. becomes. When a network problem occurs, the Mist virtual wireless assistant provides several reasons with various confidence levels. With continuous feedback from IT administrators (i.e supervised machine learning), the assistant gets more accurate and more confident over time.

In addition, with Mist's APIs, this data can be exported or automated via workflows, enabling the assistant to proactively notify the right people of exactly what is occurring.

Join the A.I.-Driven Wireless Journey
"The business world has been battered by successive waves of new technologies over the past few years, and A.I. could ultimately prove to be the tsunami of them all... Failing to embrace it could mean missing out on an opportunity for early transformation." *Nick Ismail, Information Age*

Wireless networks are becoming more business-critical than ever, yet, trouble-shooting them becomes more difficult every day, due to the many different devices, operating systems, and applications. Without a wireless A.I. strategy, IT simply cannot keep up with stringent wireless user requirements.

Companies of all sizes can take advantage of Mist's AI-driven wireless solution today. By combining a strong team of wireless experts with dedicated data scientists, Mist built the first wireless platform that delivers the following:
• Wi-Fi that is predictable, reliable and measurable
• Wireless operations that are simple and cost effective
• Location services that deliver amazing new wireless experiences.

When A.I. is in the Air, anything is possible. To learn more, visit our resources page or sign up for a live Mist demo.

A New Era of Business-Critical

Wi-Fi Assurance

Mist

A New Era of Business-Critical Wi-Fi Assurance

Using Data Science for Proactive Wireless Insight and Automation

The explosive growth of smart mobile devices, applications, and Internet of Things (IoT) has created a big challenge for legacy Wireless LAN (WLAN) products, which were all designed when Smartphones and tablets didn't exist and cloud platforms like AWS were still in their infancy.

For example, smart devices have substantially increased the number of users on the wireless network. This not only creates capacity, coverage, and interference issues that adversely impact performance, but it severely complicates Wi-Fi troubleshooting. There are way more mobile hardware platforms, operating systems, and applications today than a decade ago, which cause IT to constantly react to user issues vs. proactively planning ahead of them. Using packet sniffers and manual processes to identify and remediate problems across all these different variables just won't scale, creating the need for a better solution for wireless operations in today's smart device era.

In addition, because mobile devices have become the predominate compute platform, Wi-Fi networks have moved from nice-to-have to business-critical in most environments. Flaky wireless coverage is no longer acceptable, nor is an inconsistent experience across users and devices. Network IT needs to be proactive to the mobile user's experience to mitigate issues before they impact user experience and resolve those problems that do appear in a fast and cost effective manner.

To achieve business criticality, the following age-old Wi-Fi operational challenges need to be addressed once and for all:

- **Packet sniffing is expensive, time consuming, and often ineffective.**
  Many wireless problems are ephemeral, disappearing shortly after they arise based on changing user and environmental conditions. Sending techs onsite to reproduce the problem can be expensive, and often yields lackluster results as the data needed to reproduce and resolve an issue can be long gone.

- **It is difficult to pinpoint the root cause of problems.**
  Often times when a mobile user cannot connect or is receiving sub-par performance, the wireless network is the first thing that is blamed.However, it could just as easily be an issue with DNS, DHCP, authentication servers, or a variety of other things. Administrators need a quick and easy way to identify root causes for fast remediation.

- **Network-centric perspective.**
  When problems occur, coverage and/ or capacity are the two things usually blamed. Suggested corrections are based on predictable RF models and other AP characteristics, such as power levels and channels. This methodology ignores many wireless and wired parameters, such as sticky roaming and asymmetry. Plus it does not take into account the differences in various types of mobile devices.

- **Administrators lack visibility into what users are actually experiencing.**
  Traditional WLAN systems take a network-centric view of the world. While they are good at telling you what an Access Point is experiencing, they provide little insight into the wireless experience from the users' perspectives. This complicates troubleshooting, and makes it all but impossible to monitor and enforce service level expectations for key metrics like connect time, capacity, coverage, and roaming.

Mist built a wireless platform from the ground up to address the above issues. With patent-pending machine learning technology, the Mist platform simplifies Wi-Fi operations through automation and proactive recommendations. This ensures a better wireless experience for IT administrators, which translates to an amazing Wi-Fi experience for mobile users.

Mist's Groundbreaking Architecture

The Mist platform lets you think centrally and act locally through a combination of cloud-based intelligence and on premise Access Points. The top 3 unique attributes of the Mist platform are:

- **A purpose-built micro-services cloud architecture.**
  The Mist cloud is designed to provide unprecedented visibility and control at web scale, with a micro services architecture for extreme agility when rolling out new features/services. Unlike other wireless solutions, the Mist cloud collects real-time streaming data from all mobile devices for a unique insight into every wireless user's "quality of experience. In addition, it uses modern elements like Storm and Spark for real-time classification and analysis of Wi-Fi metrics (connect time, coverage, and capacity), as well as global correlation of events.

- **Enterprise-Grade W-Fi and BLE Access Points.**
  In addition to delivering the best Wi-Fi 802.11 wave 2 range and performance, Mist APs have integrated 16 element vBLE arrays for the industry's most accurate location services. Mist is leading the convergence of Wi-Fi and Bluetooth Low Energy (BLE), ensuring both technologies can easily be deployed at scale, while complementing one another through better coverage detection, security, and more.

- **Data science meets wireless wizardry.**
  The "secrete sauce" of the Mist platform lies in its patent-pending machine learning technology. We've taken decades of wireless experience and put it into the platform to handle everything from event correlation to dynamic packet capture to service level monitoring. Mist automates manual, mundane operational tasks to ensure the wireless network is always optimized for constantly changing user requirements and device capabilities (with minimal manual IT intervention.)

Business-Critical Wi-Fi Assurance with Mist

By building a modern wireless platform for the smart device era, Mist solves the traditional challenges of deploying and operating Wi-Fi in the following unique ways:

- **No more manual packet sniffing**
  Mist is the first and only wireless vendor with dynamic packet capture (i.e. dPCAP).When a user is experiencing a network anomaly, the Mist system automatically detects it and starts capturing packets. This enables you to rewind back in time to see what was going on in the Wi-Fi network and the mobile device when the anomaly was detected. (See Figure 1). No more sending techs onsite with sniffers to chase problems that might not even exist anymore. The data needed to fix

Figure 1 – The Mist platform performs dynamic packet capture when an anomaly is detected, with network rewind for historical analysis.

the problem is always available and at your fingertips, which reduces your IT costs and minimizes the Mean Time to Repair (MTTR) wireless problems. Given the fact that a single onsite visit with a packet sniffer can cost from $1000 to $2500, this feature alone can justify an investment in Mist.

- **Easy and accurate one-click root cause analysis.**
  The Mist solution has a Proactive Analytics and Correlation Engine (PACE) with patent-pending machine learning technology to dynamically collect information from all Wi-Fi mobile devices and correlate events for quick root cause identification.

  Because PACE analyzes each and every mobile's users RF packets, it can easily identify if the user is having a "connection", "coverage", "capacity", "throughput" or "roaming" issue. Or, PACE identifies if it is not a wireless issue at all – i.e. maybe it is a DNS, DHCP, WAN or authentication problem.

  For example, in Figure 2 it is easy to see that 4% of users are having an issue with the time it takes to connect to the network, with the majority of problems taking place the morning of January 20th. The root cause of most of these Time to Connect issues is misconfigured IP services.

- **How is the Mist PACE solution better than alternative wireless solutions?** Given the scale and complexity of wireless networks, it is no longer acceptable to look at multiple dashboards and make sense of it all. The need of the hour is actionable insights. Current wireless vendors provide event logs and byte counts, but they do limited or no correlation for quick problem identification and remediation. For example, a "Connection" issue could be due to DHCP, ARP, DNS, or a misbehaving mobile client (association, 802.1x authentication). If a wireless vendor is just providing event logs, it could take you a lot of time and effort to determine the actual source of the problem. With Mist, the root cause of problems is always just one mouse clicks away, which lets you quickly see what the mobile users are experiencing and get to the source of problems way easier and quicker than ever before (see Figure 2).

  In addition, current wireless vendors only identify problems under certain circumstances, like when a connection state machine (with connection states being Associate->Authenticate->DHCP-ARP->DNS) is successful. These solutions cannot provide insights into why a state machine failed

Figure 2 - Mist uses machine learning to correlate events and easily identify the root cause of problems (wired, wireless, and device).

or got prolonged, which means they only address part of the problem. In contrast, Mist looks at every RF packet from a mobile device and constructs a RF state machine per mobile device regardless of success or failure of the connection. This enables rapid detection and root-cause identification, regardless of the source of the connection problem.

Finally, because Mist handles correlation in the cloud, it collects and analyzes enormous amounts of data at scale. In contrast, many controller-based solutions experience severe performance degradation when debugging mode is enabled to collect and analyze the RF data. Performance should never be sacrificed at the expense of troubleshooting!

- **Visibility into user service levels.** Mist has the only wireless platform in the industry that collects realtime state information from every mobile device on the network. This has numerous benefits, among them is the ability to set service level expectation (SLE) thresholds for critical attributes that impact wireless performance, which include:

  - Connection
  - Coverage
  - Capacity
  - Roaming
  - Throughput
  - Latency
  - Jitter

If any of these parameters are violated, you are proactively given insight into the reasons why, top mobile devices affected, and top wireless networks affected. For example, in Figure 3 you can see that 2 seconds is the threshold set for Time to Connect, which is being hit 71% of the time.

With Mist's SLE dashboards, you can accurately understand, in realtime, the quality of service being offered and address issues before they become significant. In contrast, other vendors don't let you set any SLE thresholds, or limit you to one or two events that can be monitored (e.g. Time to Connect).

Mist puts all the information you need in one place, which lets you deliver a true wireless service that is responsive to your customers' needs while easy for you to design and operate.
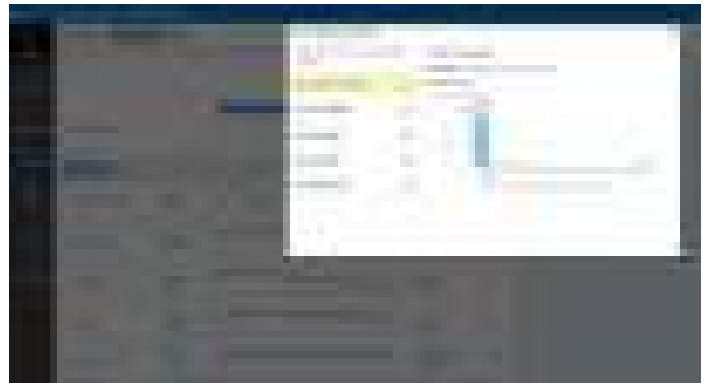

Figure 3 - Mist lets you easily setup, monitor and enforce service levels for connect time, capacity, coverage and more.

- **Visibility into user RF environment.** In addition, Mist is the only platform with "RF glasses", which gives you a real-time view of the RF environment from the mobile device's perspective. This lets you detect coverage holes (e.g. due to weak signals and interference), even as users move around and their RF coverage patterns change.

If a wireless user complains about a Wi-Fi or BLE problem, you can easily visualize in real-time exactly what their wireless environment looks like for accurate troubleshooting (Figure 4).

Mist's RF glasses provide a real-time view of the RF network and hence are way more accurate compared to other wireless vendors that offer predictive RF models that rely on power levels and channels. Unlike those solutions, Mist never uses simulated or outdated data.
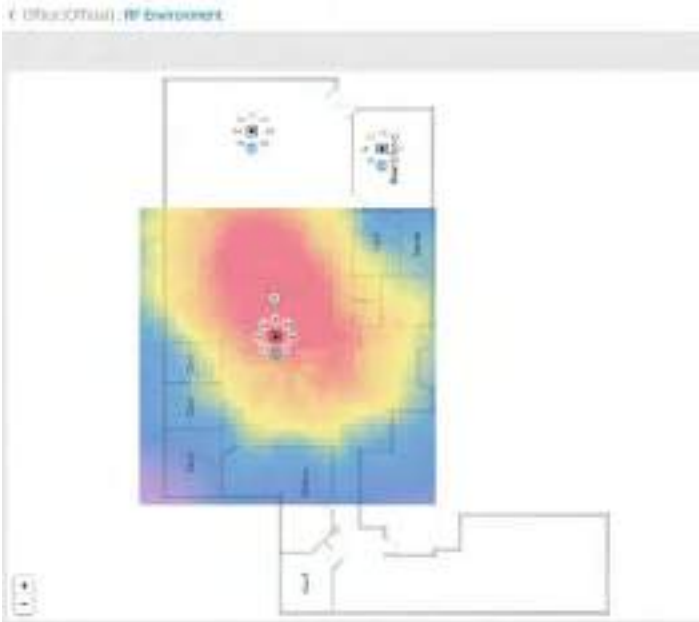
Figure 4 – RF glasses let you easily visualize in real-time exactly what the wireless environment looks like for accurate troubleshooting

Data science meets wireless wizardry

The time has come for wireless operations to move from a reactionary troubleshooting mode to a proactive one where actions can be taken that avoid problems before they arise. Plus, intelligence must be built into the wireless network so automated changes can be made in realtime, continuously optimizing Wi-Fi performance for every individual user and environment.

This is achieved with Mist's next generation wireless platform, which provides smart Wi-Fi assurance for the smart device era. By taking a user-first approach to wireless, the Mist platform simplifies Wi-Fi operations while delivering a robust wireless experience worthy of the moniker "business-critical".

For more information, visit www.mist.com

About Mist

Mist built the first wireless platform for the Smart Device era. By taking a user-first approach to networking, the Mist Intelligent Wireless Cloud (IWC) eliminates the operational burdens of legacy wireless architectures by replacing human interaction with machine learning and proactive automation. In addition, Mist takes unique advantage of user location and behavior to deliver a superior experience for wireless users.

The Mist team consists of leading experts in wireless, machine learning, and cloud, who are responsible for building the largest and most advanced networks in the world. Founded in June 2014, the company is based in Cupertino, CA. For more information, visit mist.com

MIST WI-FI ASSURANCE OVERVIEW
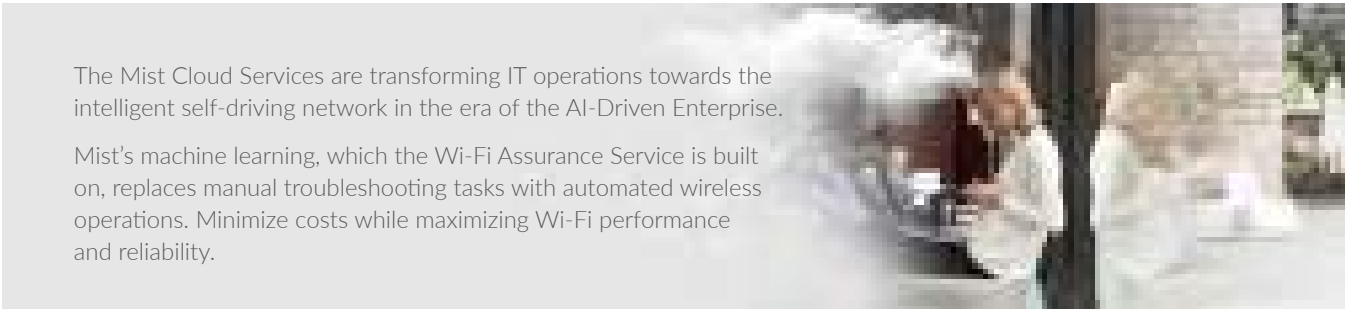
The Mist Cloud Services are transforming IT operations towards the intelligent self-driving network in the era of the AI-Driven Enterprise.

Mist's machine learning, which the Wi-Fi Assurance Service is built on, replaces manual troubleshooting tasks with automated wireless operations. Minimize costs while maximizing Wi-Fi performance and reliability.

The Mist platform is built on a modern microservices cloud architecture, which enables elastic scale to meet your changing wired and wireless access LAN Infrastructure market requirements, focusing on operational simplicity, 100% API-based programmability, and customer engagement through location based services.

Wi-Fi Assurance, driven by Mist's machine learning, replaces manual troubleshooting tasks with automated wireless operations, This subscription service makes Wi-Fi predictable, reliable, and measurable with unique visibility into user service levels. Set up and track service-level thresholds for key wireless criteria (pre and post connection metrics), such as time to connect, capacity, coverage, and throughput.

Anomaly detection automates triggers to capture packets for event correlation and builds network intelligence with RRM at the client level for unprecedented visibility into the user experience for their wireless network. Expand Wi-Fi quality to the end user with Mist Wi-Fi Assurance.,

The Mist services are 100% programmable with all functions (provisioning, monitoring, alerts) available through open APIs that enables you to integrate with your IT applications to automate your network and line of business operations.

KEY BENEFITS OF WI-FI ASSURANCE

Maximize Wi-Fi User Experience	Minimize IT Support Costs
Proactively optimize performance	Dynamic packet capture for troubleshooting
Prioritize applications, resources, and users	Proactive root cause identification
Simple and secure access to resources	Network automation with APIs

Set, Monitor and Enforce Service Levels

Setup and track service level thresholds for key wireless criteria (pre- and post- connection metrics), such as time to connect, capacity, coverage, and throughput. At any given time, you can see how your network is performing against Service Level Expectations (SLE), with deep visibility, including location context into impacted users, applications, and devices.

Comprehensive Network Performance and SLE Dashboard Analytics

In addition to proactively correlating events and providing remediation recommendations, the platform also provides a daily and weekly trend of the SLE metrics. These reports provide unprecedented visibility over the last week for longer term trend analysis into anomalies seen at the AP, device, application or OS. The current set of available SLEs are: Time to Connect, Successful Connects, Throughput, Roaming, Coverage, Capacity, AP Uptime, WAN.
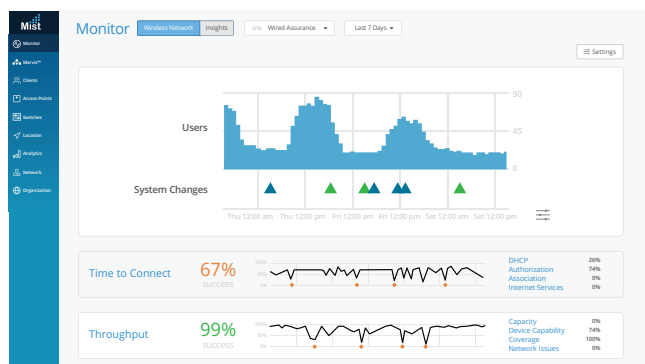
Simple Root Cause Analysis and Remediation

Mist dynamically collects information from all endpoints (over 150 state changes are captured for each client device and access point every few seconds), and correlates it for quick wireless, wired, and device problem identification. Predictive recommendations and automated workflows let you quickly remediate problems or prevent them entirely. This root cause analysis feature can be further enhanced with the Virtual Network Assistant Service added capabilities.
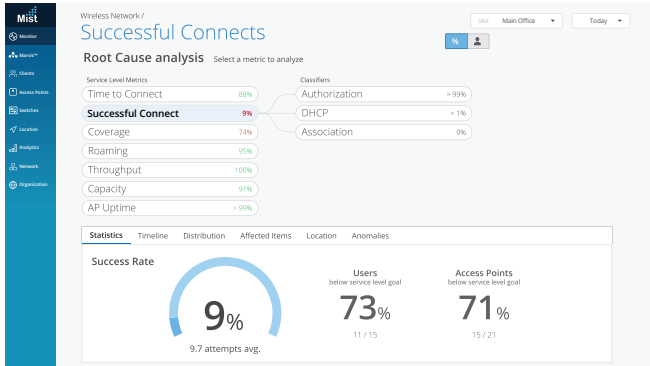
Automation for Deployment and Provisioning

The Mist platform is 100% programmable, using open APIs, for full automation and seamless integration for rapid provisioning with complementary products including our AI for IT partners across LAN, WAN, security, engagement and asset location.

Network Rewind and Dynamic Packet Capture

The Wi-Fi Assurance Service automatically detects and starts capturing packets when an anomaly is detected. With this record, you are able to rewind back in time to see what was going on exactly when the event occurred, while eliminating hours or days spent with guess work or reproducing issues to capture the data.


Client Profiling

Mist profiles clients for device types, operating systems, applications, location, and user role. This enables the Mist WxLAN to auto detect printers, Apple TV's and other IoT devices. This enables automatic detection and categorization of endpoints for security and audit reasons, without requiring any manual database management.

AI-driven Radio Resource Management

Unlike other solutions, Mist uses data science and cumulative SLE performance to learn and better radio settings to assure performance, while also instantaneously adapting to intermittent outside interference. The AI-driven RRM will take coverage and capacity anomalies based on client experience (SLE metrics) and proactively feed this into the RRM decisions, so that the RF planning continues to improve and adapt in changing environments that often occur in today's digital workplace.

WxLAN Policy Creation and Enforcement

Mist delivers operational simplicity by allowing you to create policies for role, device type, and user-based access on the network with an inline policy engine - WxLAN. Gobal labels created for physical and logical resources (users, WLAN, AP, IP addresses, IP subnets, applications) enable policies to be enforced at the edge on the Access Points.
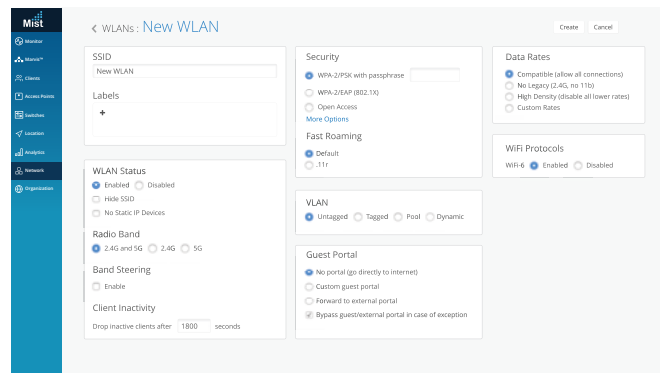
Personal WLAN

Create your own personal wireless network (with personalized preshared key) through a self-serve portal, for a secure network for usage. This can be used to secure IoT and guest traffic as well as provide a scalable solution for multi-tenant networks.

With the Wi-Fi Assurance Service, the Mist AI-driven WLAN solution is the platinum standard for any digital deployment, helping you deliver a dynamic user experience while simplifying management, planning, and troubleshooting for your IT team. This service includes the complete wireless, security, guest access, and network management functions with a single subscription.

Guest Portal

Mist enables customers to create custom guest portals that can optionally include: terms of service, email/text login or even social media login to help boost customer engagement.

Accelerate Your Digital Transformation with Network Insights

Wi-Fi Assurance includes a base analytics capability for analyzing up to 30 days of data which enables you to simplify the process of extracting network insights from data and analytics across your enterprise. Review your network throughput peaks to properly align your support resources. To extend these capabilities to 3rd party network elements and the ability to consume up to one year of data, along with the option to generate customized reports, the Mist Premium Analytics service is available as an additional subscription.

MIST WIRED ASSURANCE OVERVIEW
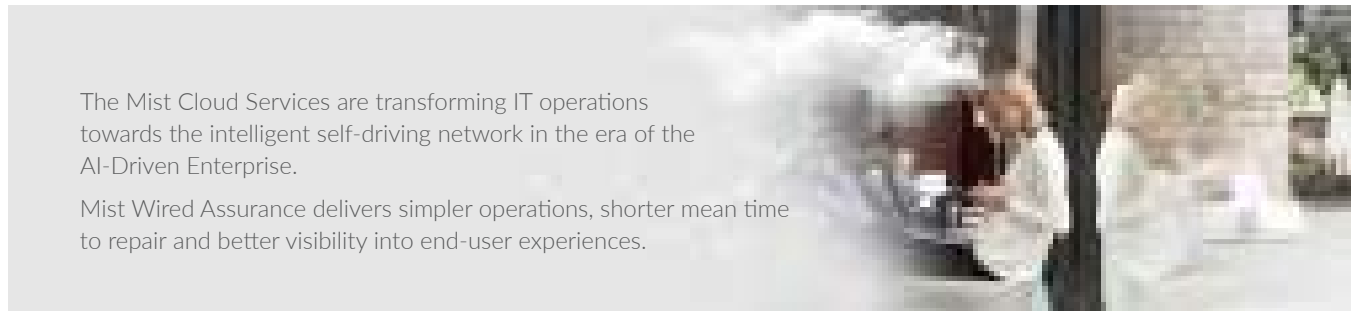
The Mist Cloud Services are transforming IT operations towards the intelligent self-driving network in the era of the AI-Driven Enterprise.

Mist Wired Assurance delivers simpler operations, shorter mean time to repair and better visibility into end-user experiences.

Mist Wired Assurance is a cloud service offering that delivers an unparalleled network experience for wired devices by transforming IT operations to shift from reactive troubleshooting to proactive remediation by turning insights into actions.

It brings visibility into wired experience and switch health assessment to the wired portfolio of Juniper EX Series Switches, in addition to IoT devices, access points, servers, printers, etc. The data is leveraged within the Mist cloud and AI engine to deliver simpler operations, shorter mean time to repair and better visibility into end-user experiences.

For insights, Wired Assurance leverages telemetry data from Juniper EX Series Switches to offer anomaly detection and identify when switch health is trending negatively. The complementary Marvis Virtual Network Assistant (with Marvis Actions) service simplifies troubleshooting and integrated help-desk functions bringing self-driving actions to the network to automatically remediate issues. This new level of automation fundamentally transforms IT operations to go from reactive troubleshooting to proactive remediation.

The Mist services are 100% programmable with all functions (provisioning, monitoring, alerts) available through open APIs that enables you to integrate with your IT applications to automate your network and line of business operations.

MIST WIRED ASSURANCE OVERVIEW

| Features	Benefits	Wired Assurance for Juniper Switching	Marvis VNA and Self-Driving for Switching
Service Level Expectations (SLEs) for wired clients	Monitor wired user experience metrics of pre/post-connection and performance for simplified troubleshooting	Yes	
Visibility to wired clients	See all your connected devices in one list	Yes	
Complete visibility on wired switch insights and health	Know exactly how your switches are performing – CPU, memory, temperature, power draw metrics	Yes	Yes
Wired switch metrics	Get key actionable insights for metrics such as POE compliance, missing VLANs,* firmware compliance, switch-AP affinity* to ensure optimal network operations	Yes	Yes – Juniper and 3rd party vendor access switches
Ask Marvis questions in natural language	Benefit from the NLP Interface of Marvis by asking questions such as list/troubleshoot wired switches	No	Yes
Proactive anomaly detection	Translates root cause to automated actions for remediating wired issues	No	Yes
Proactive recommendations for wired network issue corrections with Marvis Actions	Get your morning cup of coffee view with Marvis notifying you on missing VLANs,* bad cable replacements, correction of port negotiation mismatch and spanning tree loops	No	Yes *Missing VLANs available for 3rd party switches

Wired Service Level Expectations (SLEs)

Enforce SLEs for Juniper EX Series Switches with pre-/ post-connection performance metrics such as throughput, successful connects and switch health. Pre-connection shows the number and time of successful connects and authentication, while post-connection measures throughput, STP loops, interface errors and congestion—all with one simple click.

SLEs help to measure and manage networks proactively. It brings visibility to wired devices, such as Wi-Fi access points, IoT devices (door locks, cameras, displays, sensors, etc.), wired computers, printers, etc.
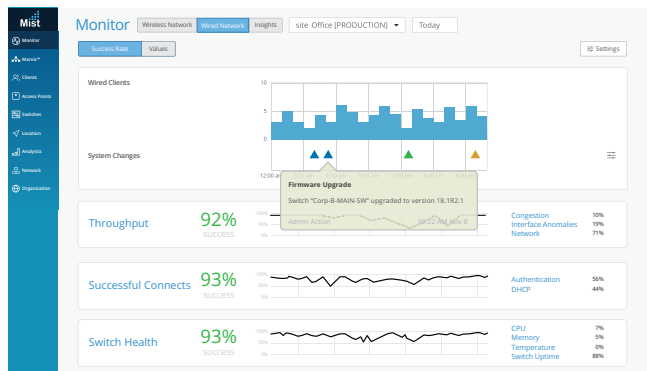
AI-Driven Switch Insights

Get switch insights down to the port level for detailed views of CPU, memory utilization, bytes transferred, traffic utilization and power draw. Receive performance series data along with real-time status data on the number of Mist APs and wireless endpoints connected. By hovering over the switch ports, connectivity details (connected speed, PoE status, and throughput) will show up. It also shows wired switch events to include configuration changes and system alerts.
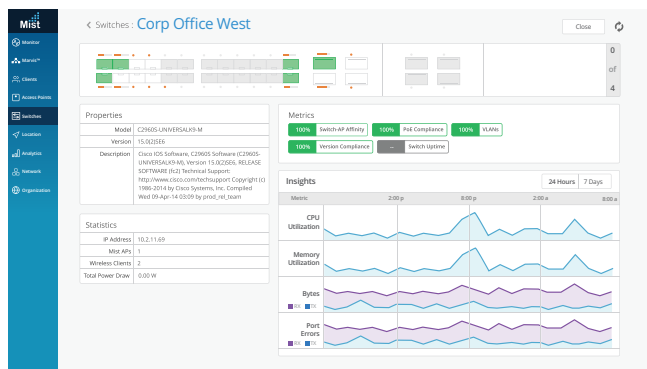
Wired Clients

See a list view of all the wired clients from the Mist Cloud, such as IoT devices, cameras, laptops, access points, etc. connected to switch ports.

Accelerate Your Digital Transformation
with Network Insights

Wired Assurance includes a base analytics capability for analyzing up to 30 days of data which enables you to simplify the process of extracting network insights from data and analytics across your enterprise. Review your network throughput peaks to properly align your support resources. To extend these capabilities to 3rd party network elements and the ability to consume up to one year of data, along with the option to generate customized reports, the Mist Premium Analytics service is available as an additional subscription.

Compatibility with Juniper EX Series Switches

The following models of Juniper Networks EX Ethernet Series Switches are supported:

- EX2300
- EX3400
- EX4300
- EX4600

![Mist - A Juniper Company]