

RADCOM



MAVERIQ
by RADCOM

RADCOM

Disrupting the customer experience and assurance market
with the first NFV-ready
100% software probe-based solution



© 2017 RADCOM Ltd. ALL RIGHTS RESERVED.

This document and any and all content or material contained herein, including text, graphics, images and logos, are either exclusively owned by RADCOM Ltd., its subsidiaries and/or affiliates ("RADCOM") or are subject to rights of use granted to RADCOM, are protected by national and/or international copyright laws and may be used by the recipient solely for its own internal review. Any other use, including the reproduction, incorporation, modification, distribution, transmission, republication, creation of a derivative work or display of this document and/or the content or material contained herein, is strictly prohibited without the express prior written authorization of RADCOM.

The information, content or material herein is provided "AS IS", is designated confidential and is subject to all restrictions in any law regarding such matters, and the relevant confidentiality and non-disclosure clauses or agreements issued prior to and/or after the disclosure. All the information in this document is to be safeguarded and all steps must be taken to prevent it from being disclosed to any person or entity other than the direct entity that received it directly from RADCOM.

The text and drawings herein are for the purpose of illustration and reference only.

RADCOM reserves the right to periodically change information that is contained in this document; however, RADCOM makes no commitment to provide any such changes, updates, enhancements or other additions to this document to you in a timely manner or at all.

Publication Date: January 2017

Web Site:

<http://www.radcom.com>



RADCOM

Intelligent, actionable insight



In today's rapidly changing communications world, how can CSPs (communication service providers) offer and maintain a high-quality customer experience that builds brand value and customer loyalty?

How can CSPs pare down excess OPEX and CAPEX while optimizing service, increasing agility, and shortening time to market, in the midst of generational network transitions, new technologies, and expanding networks?

NFV (network functions virtualization) and SDN (software-defined networking) are the answer. Decoupling network controls from proprietary hardware, and virtualizing functions so that they operate as software elements composed of easily deployable microservices allows for flexibility, automation, self-healing, and easy scaling. A virtualized network can be run on commodity hardware, and can be managed to make the best, most efficient use of all available resources at any given time.

RADCOM's cloud-native solution operates as a VNF (virtual network function), built to work perfectly with NFV-based networks, while still affording future-proof assurance for hybrid and legacy networks. Take your service assurance and customer experience management to a new level: assure a seamlessly smooth transition to new technologies as they roll out, with a stable, unified and integrated solution that's ready for it all. RADCOM has been creating innovative solutions for CSPs for 25 years, powering their ability to reliably and continually deliver top-quality service to their subscribers.

Display a per-subscriber pre-service view of network performance

Measure customer experience and customer satisfaction

Know and understand customer behavior

Show a unified view of the customer

Provide individual service quality metrics

Retain +
Gain Subscribers

Improve Brand Value,
Create Business Value

Get Out Ahead of the
Competition: Future-Proof

RADCOM: Virtualized Assurance

RADCOM has made the virtualization transition its focal point, ensuring service providers have a fully cloud-native NFV-ready assurance solution in place now, ready for a smooth transition at the CSP's pace.

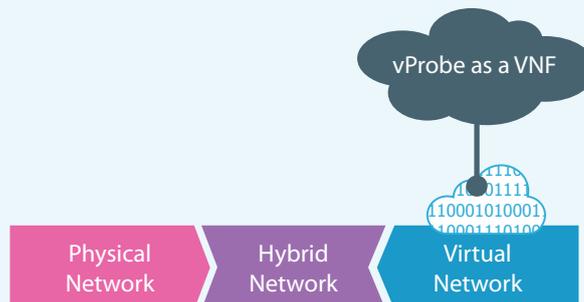
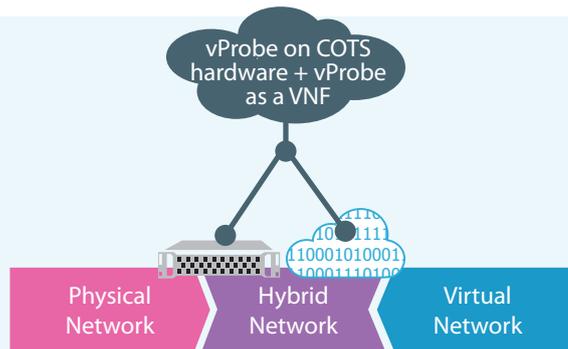
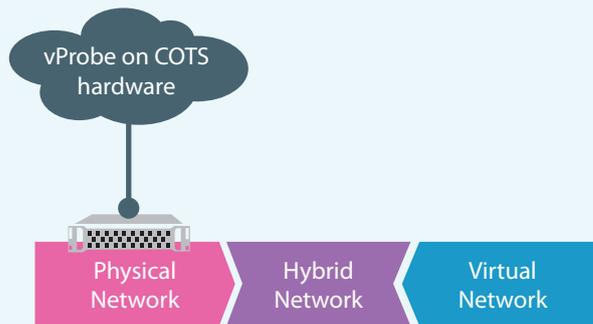
Features	Benefits
Single software, single license: fits physical, virtual and hybrid networks.	50% or greater reduction in costs (CAPEX and OPEX)
vProbes are virtualization-ready and software-based. Save on hardware costs for deployment, maintenance and upgrades: expand your network traffic without overspending your budget.	Significant return on investment: <ul style="list-style-type: none"> • Hardware-based and hybrid/transition networks: deploy as a software-based solution on COTS hardware • NFV (virtualized) network: unlock a license to deploy the same solution as a virtual network function (VNF)
Integration into any standard ETSI-compliant Management and Orchestration (MANO) (including Open Source MANO and AT&T's ECOMP).	Seamlessly slots into all standard NFV environments.
Cloud-native, fully virtualized. Works as a VNF (virtual network function) with: <ul style="list-style-type: none"> • Works with OpenStack and VMware • Completely automated system deployment • Automated horizontal and vertical scalability • Auto-healing • On-demand probing 	Fast deployment (3-6 month e2e). Delivers dynamic assurance that automatically reacts to network demands and traffic fluctuations.
Big Data ready: built-in architecture for Big Data analytics.	Business value driven application library, using real-time network events.
Monitors physical, virtual and hybrid networks; assures seamless customer experience, even during migration: NFV-ready when you are.	Single set-up, single learning process: future-proof and cost-effective.
Proactive troubleshooting maintains customer quality of experience.	Retain and gain subscribers.
True multi-tech support; provides a unified cross-technology network quality assurance solution: 3G, LTE, VoLTE, WiFi, VoWiFi, VoIP, IMS, SIGTRAN, Fixed and mobile broadband, vEPC, vIMS	Provides a unified solution that assures service quality across all network technologies
Full QoS and customer experience assurance; visibility into: Subscribers, Networks, Roamers, VIPs, Geographical regions, Devices	Offers a thorough and complete view of service and customer experience across the entire network for cross-technology, comprehensive insight and troubleshooting.
Receives and processes XDRs from any NE-VNF: integrates data from external VNFs for a comprehensive view of service and customer experience across the entire network.	

One unified product to fit any NFV migration approach:

MaverIQ enables CSP migration to NFV at any pace, while assuring customer experience and network services. CSPs can invest in a solution that fulfills their needs now for legacy physical or hybrid (partially virtualized) networks, knowing that the same solution can be utilized for fully virtualized NFV networks.

Whatever the CSP's speed of virtualization transition, RADCOM's MaverIQ immediately disrupts the sizeable costs of physical probe-based service assurance, including the OPEX

and CAPEX associated with initial setup, network capacity upgrades, new technology adoption and maintenance payments. MaverIQ vProbes are software-based probes that can function as native VNFs (virtual network functions) when placed in an NFV interface. The vProbes integrate into the network from day one. CSPs can stop investing in equipment-based probes right away, and extend the same architecture to the legacy (physical) equipment. This means huge savings from the outset.



Service assurance
customer experience assurance





Assuring the NFV transformation

Maveriq is based on a multi-technology high performance virtual probe (vProbe), and can be installed either on COTS servers or as a VNF within a fully virtualized network environment. It addresses multiple needs: performance analysis, customer experience assurance, service monitoring, service optimization and network monitoring, as well as subscriber and network troubleshooting. By monitoring all network technologies, Maveriq provides CSPs with a unified platform to manage the network complexity that occurs when running voice, video and data services across multiple interfaces and technologies.

Maveriq can be initially deployed on bare metal x86 COTS servers and then later seamlessly transformed into a fully NFV-based virtualized solution using the same software modules and licenses. RADCOM's Maveriq Solution non-intrusively monitors virtual and/or physical networks, using RADCOM's virtual software probes. These virtual probes analyze network traffic in real-time at wire-speed, generating real-time XDRs (eXtended Detail Records) per session per subscriber. XDRs are transmitted from the vProbes to a central backend processing and mediation layer where the XDRs are further processed (XDR enrichment, correlation, aggregation, alarming) and inserted into the Maveriq columnar database. In parallel, raw packets are stored locally in the virtual probe's storage and are available for packet-level tracing. RADCOM leverages the latest packet processing technology, leading QoE algorithms and over 25 years of

industry experience and expertise working with the world's leading telecom CSPs. Using RADCOM's solution for NFV, CSPs can rapidly increase network analytics capacity as needed, by adding virtual probe instances on additional VMs (probe on demand).

Maveriq supports automated onboarding, healing and scaling, thus increasing redundancy and network availability using standard ETSI-compliant NFV Management and Orchestration (MANO). The Maveriq solution can be seamlessly deployed in any ETSI-compliant NFV environment, including OpenStack and VMware, OpenSource MANO, and AT&T ECOMP architectures.

Using NFV, RADCOM's solution dramatically reduces CAPEX and OPEX by eliminating the need for costly proprietary hardware. In addition, the time and effort required to deploy the complete solution is reduced from weeks to hours using a completely automated on-boarding process which utilizes the latest Cloud and DevOps technologies. Legacy assurance solutions tend to choke on the demands of today's high capacity networks; but Maveriq's modern architecture is built to handle the demands of current networks and future virtualized networks — that will deliver almost unlimited capacity — so that real-time data is delivered to the CSP whatever the traffic load. Technologies such as massive parallel processing, Big Data analytics and a columnar database result in substantially faster processing and application responsiveness delivering the critical business intelligence to the CSP that they need to maintain network services and high network performance.



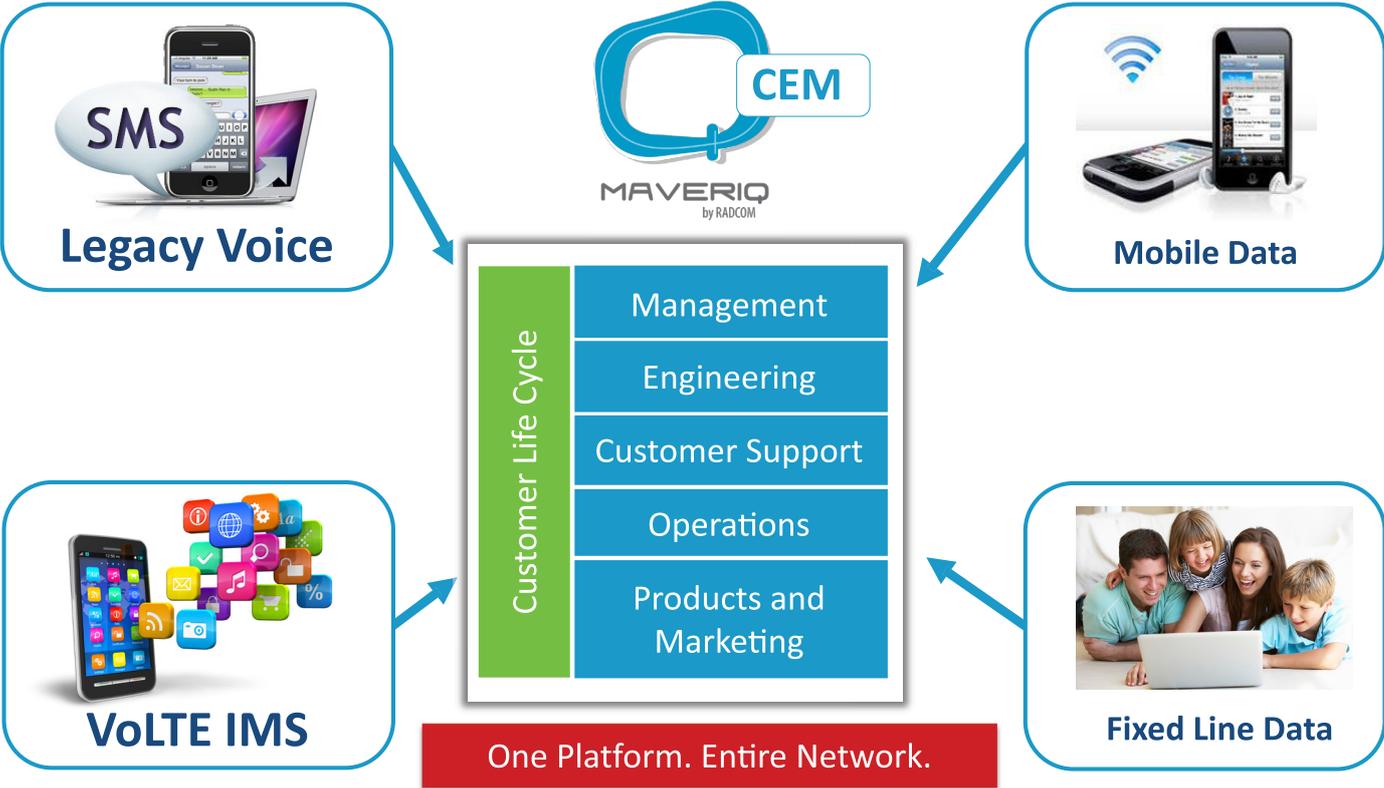
Highlights

- 360° view of the customer's quality of experience
- Provides actionable network intelligence
- Ensures quality of service and quality of experience for voice, data, VoLTE, SMS, fixed mobile and broadband and services
- Proactive troubleshooting and predictive analysis reduce churn
- Improves VIP customer experience, protecting revenue streams
- One correlated end-to-end view across mobile and IMS networks for subscribers, networks, roamers, VIPs, geographical regions and devices
- Scalable for terabit networks

NFV Customer Experience Management

RADCOM's MaverIQ CEM tools use data captured from multiple data sources for all subscribers 24/7, to create a QoE index (quality of experience) that represents the voice of the customer. This QoE index is calculated for a single subscriber, as well as aggregated for handsets, applications, geographical locations, network elements, such as MMEs and for application groups, such as APNs. The QoE index forms the basis of RADCOM's CEM solution and provides CSPs with a clear and unified view of their customers' experience across multiple services such as streaming video, voice and VoLTE, and web browsing, running over a wide range of technologies.

MaverIQ is software-based and NFV-ready, helping CSPs to manage the exponentially increasing data explosion without the need to deploy expensive hardware. CSPs can view unified quality of experience dashboards across physical, hybrid and virtual networks.





Customer Experience Management is a customer-centric approach to optimizing quality of experience and service, the best way to retain subscribers and prevent churn. RADCOM's virtual probe-based MaveriQ solution helps CSPs (Communication Service Providers) proactively assure and maintain top-level customer experience. This is essential for day-to-day network management. It is critical when launching new services or migrating to new network infrastructure, assuring a smooth roll-out while continuously maintaining high quality customer experience.

The MaveriQ multi-technology vProbe-based solution collects and correlates user data for a full picture of customers' real-life experience. With many services like VoLTE running through multiple parts of the network, CSPs need full end-to-end visibility, avoiding any blind spots into user experience or network service performance.

Typically, a CEM deployment requires investing substantial amounts of both time and money in a solution that requires multiple-system integration, often including third-party probes. With RADCOM's modular CEM offering, CSPs can purchase only the

tools that fit their specific needs. For example, a CSP may want to focus on assuring customer experience for roaming traffic, which brings in significant revenue streams.

Using real-time big data capabilities, MaveriQ employs a comprehensive array of methodologies and metrics, including both ready-made CSP workflows and the ability to build and manipulate individual reports and scenarios, to continuously analyze service performance and quality of experience, yielding detailed, objective insights into customer experience. MaveriQ's enhanced correlation capabilities offer full end-to-end network visibility across technologies, with the ability to drill down for root cause analysis and troubleshoot at the session level: the best way to reduce diagnosis and remediation time.

RADCOM's MaveriQ centralized CEM solution offers actionable intelligence in a single interface, enabling proactive improvement across multiple departments, for market-leading excellence in customer experience and satisfaction across all CSP products and services, both new and established.

Step into the future
with MaveriQ



RADCOM's unique service assurance solution

presents a pre-integrated suite of applications specially built from the ground up for the specific needs of groups in CSP organizations. Use our NFV-optimized (and legacy-compatible) tools to help boost network performance, customer satisfaction and retention, and revenue.

	What can it do?	Key features
 QVIP Take constant care of your VIPs	Assure your VIP subscribers' customer experience	VIP Dashboard, Threshold Alarms, Historical Trends, Data Filtering, VIP Zoom-In
 QiCare Your customers expect more!	Rapidly resolve customer care calls	Instant QoE Index, Bill Shock, Buster, Speed Dashboard, Device Use Trends
 QMyHandset Know what customers are using	Identify mobile devices for problem-solving, sales and marketing	Device Dossier, Trend Comparison, Campaign Monitor, Upgrade Assurance
 QAlarm Keeping an eye on KPIs	Track network performance and service KPIs with automated alarms	Tagged Alert, Umbrella Alarm
 QTrace Track down issues in real time	Trace calls and troubleshoot subscriber issues quickly	Real-Time Resolution, Root Cause Analysis
 QRoam Make the journey better	Improve roaming revenue	Cross-Bill Verify, Roaming Analytics, Drill-Down Detector
 QConnect It's all interconnected	Verify billing and interconnection SLAs	RegReq Check, Parameter Focus, Data Drilldown, Configure
 Marketing Analytics Correlating customer connection	Provide customer usage trends across multiple touchpoints	Device Assure, Market Intel, OTT Compete, Data Reserve, Churn Conversion
 QMyNetwork Follow the network node by node	Analyze network elements and links	See 2-3, Signal Scope, CounterStat, AssociStat, Event Info
 QiSolve Self-heal your network	Self-heal and auto-adjust your radio network	Cell Decongest, Network Sleuth, QoE Query, Time Converge, Traffic Merge
 M2M Machines, well connected	Monitor and optimize M2M and IoT services	M-Watch, Pattern Interrupt, M-Group Trend, IoT Cloud Info
 QExpert Reporting for duty	Advanced options for pre-defined reports	Same-Tool Support, Report Update, Cross-Solve, Cross-Section
 QCell Uncap your cell capacity	Analyze and optimize QoE by location	QoE Dashboard, QoE Analyze, KPI Trend, QoE Slicing Map, QoE G-Map, Drilldown Detect, QTrace Connect
 QInsight Take a deep dive into data	Enhanced self-BI analytics dashboards and visualizations	Responsive Dashboard, Self-BI, Mark-Up Together, Email Alerts, Story Slides, Auto Display, High Performance

For more details, see radcom.com



Solution overview

Data Acquisition Layer

RADCOM's MaveriQ NFV solution covers virtual, physical and hybrid network architectures, providing an end-to-end Service Assurance view of the network as it is transitioned from physical to virtual network functions/elements. MaveriQ vProbes can receive and process packets from multiple sources/methods including virtual port mirroring, vTAP, physical port mirroring and directly from VNFs and/or TAPs over GRE Tunnels. vProbes utilize technologies such as DPDK, SR-IOV and MPP to achieve high software performance and efficiency.

In addition, MaveriQ's backend can receive and process XDR/EDR feeds from 3rd party legacy probes and network elements using real-time processing modules that convert the data to standard formats.

Advanced Real Time Processing Layer

The centralized backend processing layer is comprised of real-time software engines that perform aggregation, correlation, and enrichment in real time before XDR insertion to the database, thus offloading the database to achieve superior performance and making KPIs available in real time internally, as well as on northbound interfaces. The processing layer enables advanced statistical computations such as unique subscriber per cell, per roaming partner, per website, Top X analysis for instance, top performers, top websites, and top handsets on all multiple KPIs and over multiple dimensions in a matter of seconds.

Database Layer

The MaveriQ solution includes an embedded state-of-the-art HP Vertica column database which provides the ability to perform real time analytics for large terabit networks. The Vertica database is a column based databases that stores all information in columns, thus eliminating the need for indexing and allowing for smart queries working only on relevant columns, as opposed to the entire row, in a traditional database.

RADCOM leverages Vertica technology to provide:

- Ultra-fast queries using Massively Parallel Processing technologies
- Superior compression reducing CAPEX and allowing more historical data to be stored on the same storage
- High availability and recovery
- Automatic data replication, failover, and recovery provide for active redundancy, increasing performance. Nodes recover automatically by querying the system
- Columns are duplicated across cluster nodes. If one machine goes down, you still have a copy K+1 redundancy as default. K+2 optional.



Big Data, Analytics, Data Presentation and Applications

RADCOM's BI and Analytics platform provides users with portal based workflows and drillable reports, as well as ad-hoc reports to receive end-to-end insights and troubleshoot the network, services and subscriber issues, customer experience and network performance. It includes a suite of applications specially built to serve the needs of specialty groups within the CSP's organization; Customer Care, Marketing, NOC, QoE and Network Operations. Data is provided in real time with analytics insights in ready-built dashboards within minutes.

Maveriq Manager

The Maveriq Manager is the operations, administration and management component of the Maveriq solution. In an NFV deployment it acts as the VNF Manager that synchronizes with the orchestration and installs the system via the onboarding procedure. Once the Maveriq Manager has installed and verified the system is up and healthy, it runs scripts to automatically configure the system so that the system is fully operational and ready to monitor the network.

While Maveriq is running, the Maveriq Manager constantly communicates with all the solution elements to make sure system health is maintained, assuring that network services and customer experience are monitored at all times.

- Orchestration & Automation via Maveriq Manager
- Software-only solution
- Low footprint / high performance
- Unlimited horizontal scalability
- Smart session-aware load balancing for MME as well as S/PGW traffic

Cloud-Native

RADCOM's Maveriq is a cloud-native solution providing CSPs with an agile service assurance solution that can be seamlessly deployed in different cloud environments which can be scaled up and down, as and when needed. By designing Maveriq to be cloud-native, RADCOM decoupled the solution's functionality from physical hardware, unleashing a whole new level of automation and agility (when deployed in an NFV environment); such as automated on boarding, advanced scaling and on demand probing.

CSPs can also enjoy the benefits of a cloud-native solution even when deploying Maveriq on a physical network. With all the Maveriq functionality being in software, the solution can be deployed on standard Commercial-off-the-Shelf (COTS) hardware passing on significant savings to the CSP from the initial deployment through to maintenance and network capacity upgrades.

Ensuring CSPs
deliver an
exceptional
customer experience





Tier 1 references

The MaveriQ solution is widely deployed with Tier 1 CSPs worldwide. Recently, due to RADCOM's NFV expertise and proven ability to deliver and support large scale implementations for Tier 1 operators AT&T selected RADCOM as its sole assurance vendor for its domain 2.0 project. AT&T's goal in this project is to transition 75% of its network to NFV by 2020.

"RADCOM is a disruptor in the service assurance area that has not played in the traditional hardware probe business. We were seeking an innovative solution

to virtualize the probing function from a software-centric company. We believe that virtualization of service assurance can provide distinct advantages... RADCOM's MaveriQ software has the right features, performance, efficiency and scalability to serve a large complex customer like AT&T." - Susan A. Johnson, senior vice president of global supply chain at AT&T.

To read more:

- [AT&T Story](#)
- [Media reference](#)



TELECOM



un mundo próximo





RADCOM



RADCOM

Please feel free to get in touch, or let us know how we can reach you. We can and will customize our solution to fit your business needs.

Corporate HQ

RADCOM Ltd.
Tel: +972-3-645-5055
Fax: +972-3-647-4681
email: info@radcom.com

Brazil Office

RADCOM (Brazil) LTD.
Tel: +55-11-4195-5281
email: brasil@radcom.com

India Office

RADCOM Trading India Pvt. Ltd.
Tel: +91-11-6654-4079
Fax: +91-11-6654-4052
email: india@radcom.com

USA Office

RADCOM Equipment Inc.
Tel: +1-201-518-0033
Fax: +1-201-556-9030
1-800-RADCOM-4
email: info@radcomusa.com

Singapore Office

RADCOM Ltd.
Tel: +65-6841-5755
Fax: +65-6841-7971
email: singapore@radcom.com

Copyright © 2016 RADCOM Ltd. All rights reserved. This documentation contains proprietary information of RADCOM Ltd. Without the express prior written permission of RADCOM Ltd., no part of the contents hereof may be used for any other purpose, disclosed to persons or firms outside the recipient company, or reproduced by any means. RADCOM Ltd reserves the right, at its sole discretion, to make changes at any time in its technical information, specifications, and services.