

Spectra2 LTE Use Cases

Launch LTE Services with Confidence





About This eBook

Welcome to Spectra2 LTE eBook.

In this eBook we will be illustrating a few typical Spectra2 LTE Use cases and how they relate to the Services and Technology aspects. We will highlight the steps needed to identify the root cause and suggest areas that should be fixed or improved.

We are confident that you will have an appreciation for the amount of time saved by the Spectra2 LTE solution and will inquire more about how Tektronix Communications can help you.

Enjoy this rolodex of Use Cases!

The Core Test Team
Tektronix Communications

Table of Contents



- UC #1: EPC Simulation
- UC #2: Mobile Data Traffic Modeling
- UC #3: vEPC Testing
- UC #4: VoLTE Testing
- UC #5: DPI Testing
- UC #6: MME Testing
- UC #7: SGW Testing
- UC #8: PGW Testing
- UC #9: Small Cell Simulation
- UC #10: Mobility Testing
- UC #11: Location Based Services (LBS) Testing
- UC #12: eMBMS Testing

UC : Use case

EPC Simulation

Spectra2 LTE simulation includes key EPC nodes – MME, SGW and PGW. It supports bi-directional traffic exchange on S1-MME, S1-U and SGi interfaces. This allows communication with LTE access infrastructure as well as operator application services deployed on the public internet. All the transport and application layer state machines are fully emulated to reflect the EPC environment.

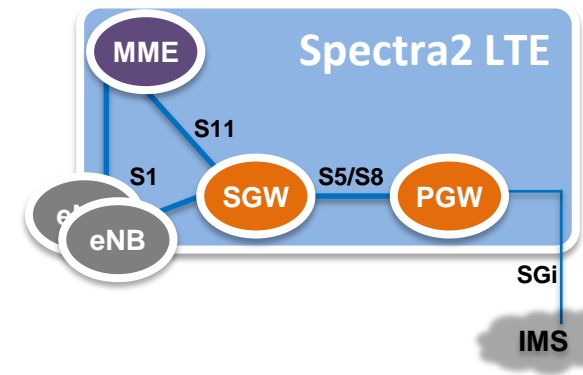
How Spectra2 LTE can help ?

1. Prototype distributed EPC configuration
2. Normalize the testing of multi-vendor LTE access solutions
3. Characterize LTE access solutions before trial/delivery

1

How can we test control and data plane functionality on eNodeB without Investing in the LTE packet core?

Spectra2 LTE can be configured to simulate an EPC on one or more servers. This allows for separation of the EPC functional elements emulating real-world deployment.



Mobile Data Traffic Modeling

Spectra2 LTE can simulate millions of mobile subscribers and originate data requests for them over S1-U interface. It can also terminate incoming mobile application requests over SGI interface and generate required download traffic towards EPC. These capabilities enable data plane performance validation and benchmarking.

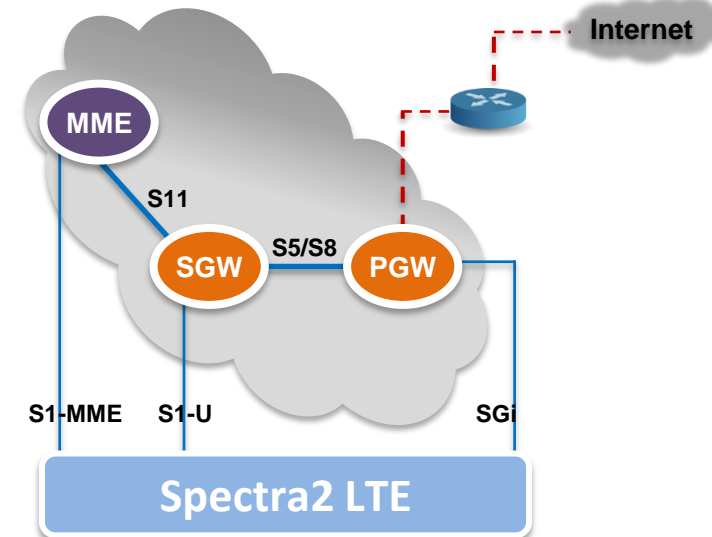
2

How can we model Mobile traffic composed of multiple data types with varying QoE expectations?

Ability to test multiple application data traffic types over default bearer for each mobile enables mobile data traffic modeling and test for QoE.

How Spectra2 LTE can help ?

1. Testing bearers, tunnels, keys and IP addresses
2. How many avid streaming subscribers can my EPC deployment handle?
3. How much of my EPC bandwidth can be used for a particular traffic profile?
4. How resilient is the EPC to various data traffic types?
5. How can we test HTTP, SMTP, FTP, POP3, P2P traffic types?
6. How can we test DNS servers for overloading conditions?



vEPC Testing

EPC virtualization is triggering new wave of implementations focused around building **elastic packet core** environments to leverage the COTS infrastructure. Spectra2 LTE's simulation capabilities address some of the key concerns of a virtual EPC in terms of **scalability and consistency**. With the ability to simulate thousands of nodes in LTE access and packet core, customers can validate new virtual solutions from vendors for **functionality and performance**.

How Spectra2 LTE can help ?

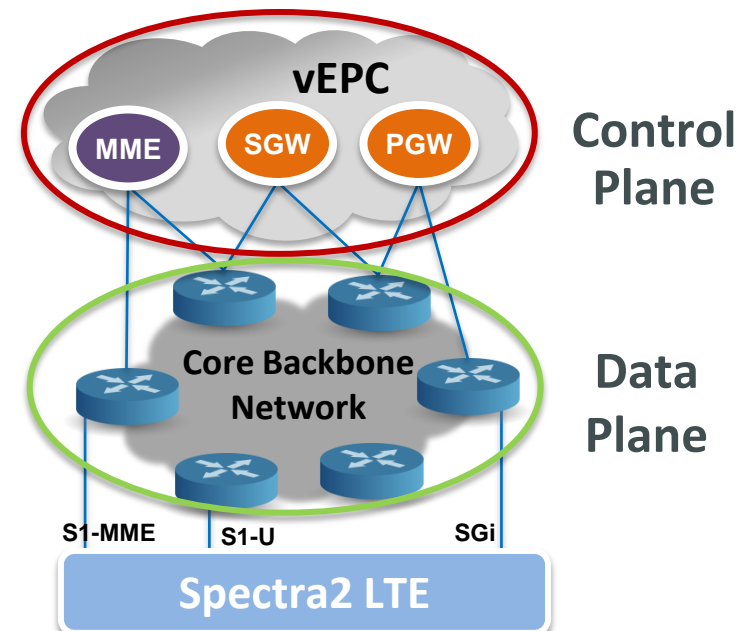
1. Testing separation of control and data planes
2. Testing state-less user-plane architecture
3. Retest handover and address delegation operations in vEPC environment
4. Testing backward compatibility cases

Orchestrator Integration is on the Roadmap

3

How can we test the elasticity of vEPC?

Spectra2 LTE provides a simulation environment with an API to control the subscriber operations. As subscribers are switching between eNodeBs, several vEPC Use Cases related to dynamic load adjustments can be created.



VoLTE Testing

Requires Spectra2

Spectra2 LTE leverages on Spectra2's IMS test capabilities to provide End-to-End VoLTE testing, performing Service QoE and mixed VoLTE+data traffic modeling. Spectra2 LTE streams the VoLTE traffic generated by Spectra2 traffic model and injects into EPC a representation of UE VoLTE session. VoLTE+data models enable dedicated and default bearer testing.

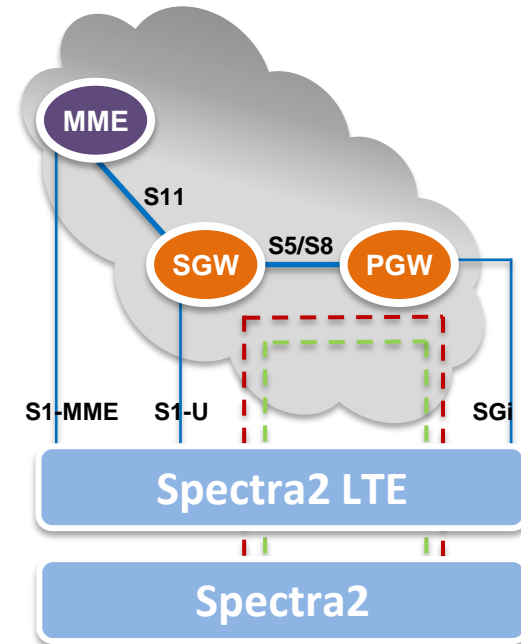
4

How can we test VoLTE QoE and ensure that new VoLTE device stack from vendor works well with my EPC?

Spectra2 LTE offers VoLTE call flow modeling capabilities to test for possible manifestations of the new device stack changes.

How Spectra2 LTE can help ?

1. Create VoLTE test models using PCAPs from vendors before launching the new devices.
2. How can we benchmark VoLTE service?
3. Assess the impact of simultaneous Data services on an active VoLTE session
4. E2E validation of IMS AKA IPsec VoLTE sessions
5. Diameter Network/Routing testing



DPI Testing

Deep Packet Inspection is responsible for enforcing **traffic shaping and policing**. It is also deployed to **detect security attacks** and **optimize resources**. Some of the other uses of DPI include **fair usage** of bandwidth policy management, **P2P traffic** shaping and filtering, **QoS and SLA** management and traffic profiling. **Flow management** is at the heart of the DPE deployments.

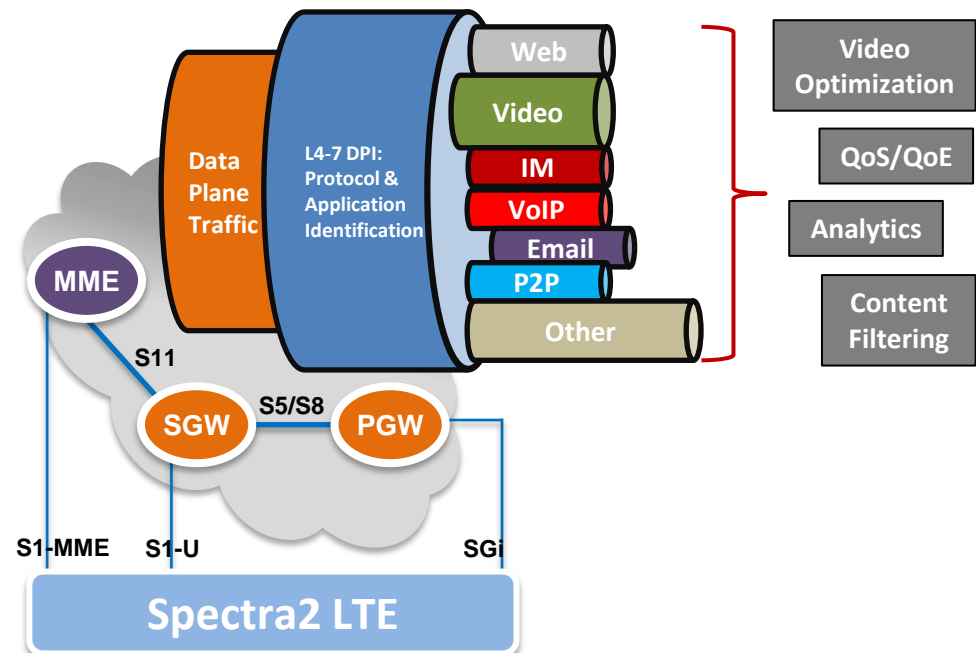
How Spectra2 LTE can help ?

1. How can we test Subscriber level flow detection?
2. How can we test Application level flow detection?
3. How can we test P2P flow identification & control?
4. How can we test the throughput of the DPI device?

5

How can we test our DPI functionality to detect and allow/disallow different traffic types?

Spectra2 LTE can generate numerous common mobile traffic types providing granularity on a per-UE basis. This allows all critical elements of the EPC to be engaged and tested for functionality & performance.



MME Testing

Spectra2 LTE provides real-world simulation of millions of UEs in various stages of **activation, deactivation and handoff** between cells. It provides the ability to originate/terminate S1-MME and S11 interfaces. Both S1-AP and NAS procedures are supported on S1-MME. It also supports mandated NAS signaling security mechanisms to test authentication and authorization functions.

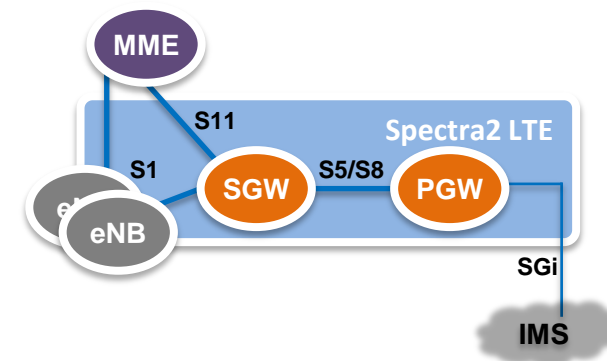
How Spectra2 LTE can help ?

1. Attach, Detach and Handover testing
2. Session and Bearer management procedure testing
3. Signaling Storm testing
4. Signaling Impairment testing
5. How can we test GTPv2 procedures?
6. Test SGW/PGW selection Use Cases

6

How can we benchmark and bracket test an MME for a given LTE access configuration?

Spectra2 LTE simulates eNodeBs and SGW elements that surround an MME. This simulation helps test MME for real-world deployment scenarios in the absence of other EPC nodes.



SGW Testing

Spectra2 LTE provides real-world simulation of millions of UEs, supporting control and data plane traffic generation as necessary. It provides the ability to originate/terminate S1-MME/S11, S1-U and S5/S8 interface traffic. It can also receive network triggered paging requests and deliver them to the appropriate eNodeB and UE pair.

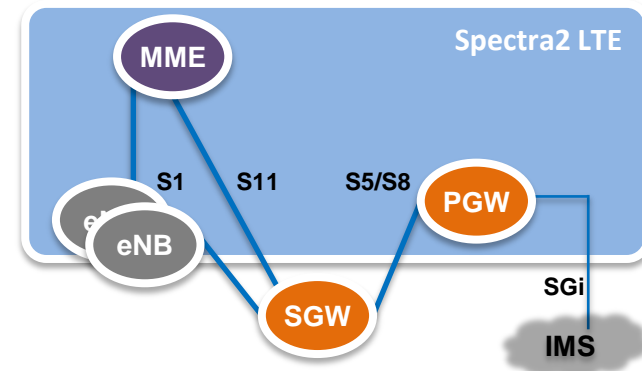
How Spectra2 LTE can help ?

1. Data path testing between eNodeBs and PGW
2. Testing Routing/Forwarding packets at SGW
3. Testing inter-eNodeB handovers
4. Benchmark Lawful Intercept nodes

7

How can we benchmark and bracket test an SGW for a given LTE access configuration?

Spectra2 LTE simulates eNodeBs, MME and PGW elements that surround an SGW. This simulation helps test SGW for real-world deployment scenarios in the absence of other EPC nodes.



PGW Testing

Spectra2 LTE can simulate millions of UEs and numerous application services on SGi interface on a per UE basis. It provides the ability to originate/terminate S5/S8 interface traffic for bearer management. The variety of the traffic that Spectra2 LTE supports enable verification of DPI and Policy functions.

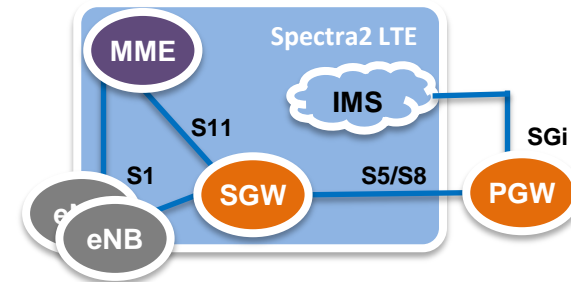
How Spectra2 LTE can help ?

1. Test packet data interface termination
2. Test PDN Session anchoring for mobiles
3. Test rate enforcement policies
4. Test service level charging use cases
5. Test UE IP address allocation schemes

8

Policy function is deployed on PGW to optimize resources. How can we test Policy Enforcement Function in EPC?

Spectra2 LTE simulates eNodeBs, MME, SGW and Application Server elements that surround a PGW. This simulation helps test PGW for real-world deployment scenarios in the absence of other EPC nodes.



Small Cell Simulation

Spectra2 LTE can simulate numerous eNodeBs and thousands of mobiles for each of them. Traffic from multiple eNodeBs is aggregated and directed towards EPC. It can also simulate Ues and eNodeBs simultaneously accessing the LTE network simulating handovers and location updates.

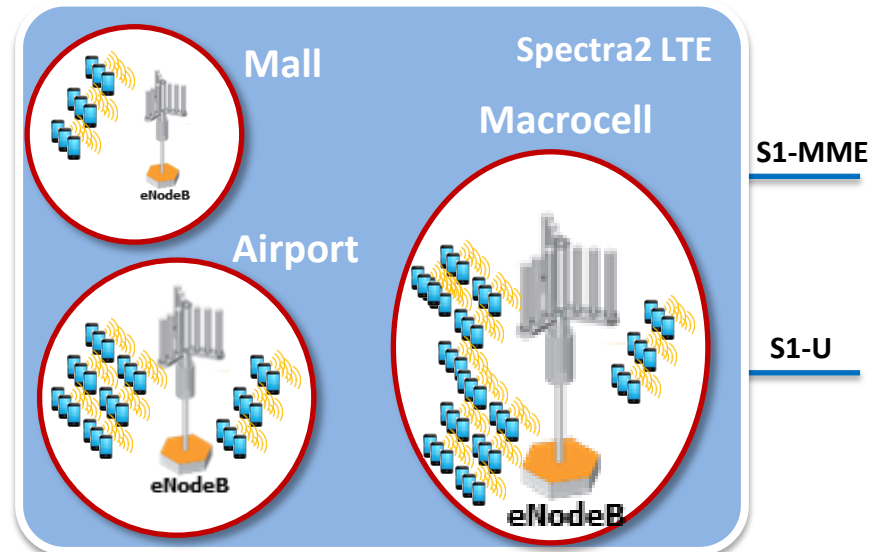
How Spectra2 LTE can help ?

1. Target SmallCell type (Micro, Pico, Femto) sizing
2. Real-world subscriber modeling
3. Testing Service QoE from EPC to SmallCell subscribers

9

How can we test subscriber loads on EPC for planned expected SmallCell growth ranging from small rural town to the largest metropolitan city?

Spectra2 LTE can quickly simulate SmallCells representing different traffic profiles such as Malls, Stadiums, Airports, etc... that help test EPC for anticipated network loads.



Mobility Testing

Roadmap Item

10

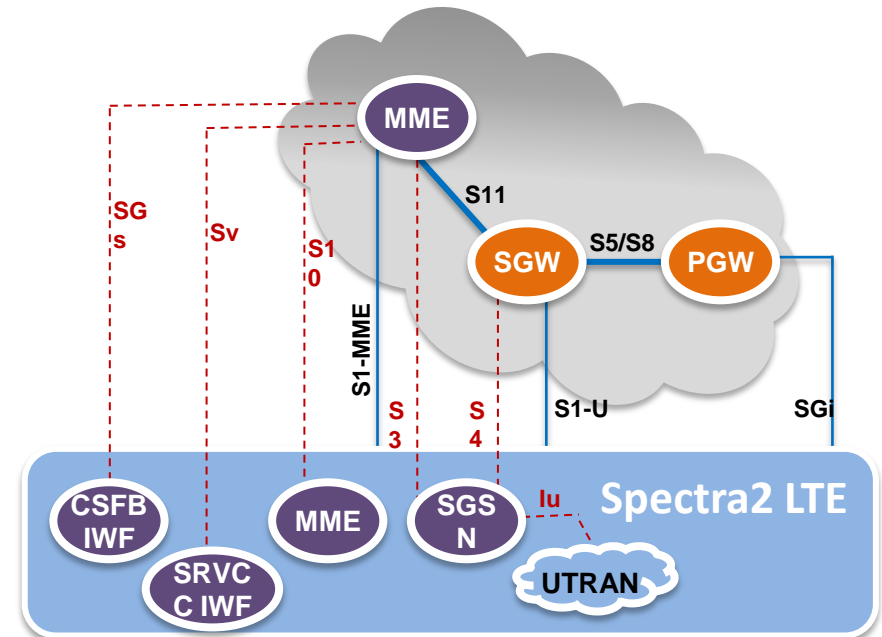
How can we simulate inter-RAT mobility scenarios for backward compatibility testing with old generation mobile infrastructure?

Spectra2 LTE will be enhanced with S3 and SGs interfaces that provide the CSFB test functionality. S10 interface will be added for inter-MME mobility testing. Sv and S102 interfaces will be added to provide SRVCC test functionality.

New planned additions to Spectra2 LTE will provide the inter-RAT test capabilities.

How Spectra2 LTE can help ?

1. Inter-MME Mobility
2. Inter SGW Mobility
3. Circuit Switched Fall Back
4. Single Radio Voice Call Continuity



LBS Testing

Roadmap Item

11

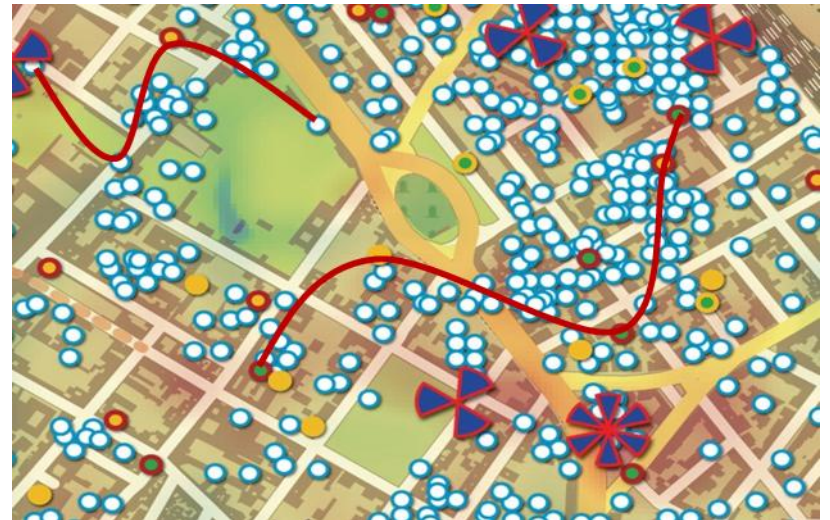
How can we test the accuracy and capacity of the LBS solutions?

LBS is critical to mobile commerce applications for both businesses and operators. LBS applications range from simple push services, such as weather and traffic alerts, to more complex and interactive services, such as personal safety/emergency services, family locator, and workforce/asset locator applications. An misbehaving LBS application results in customer churn.

How Spectra2 LTE can help ?

1. Testing workforce and asset tracking
2. Testing Points of Interest
3. Testing Geo-coding and spatial alert applications
4. Testing user privacy and geo-social applications

Spectra2 LTE will be enhanced to assign a time-based pre-defined geo-location paths to random mobiles.



eMBMS Testing

Roadmap Item

12

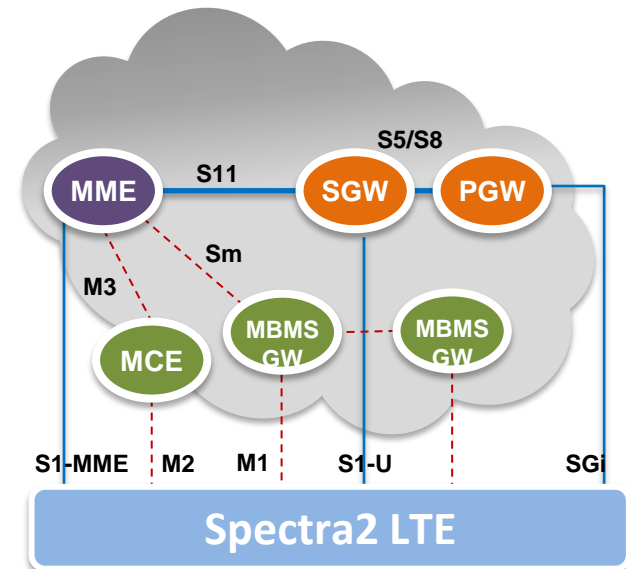
How can we test the scalability of an eMBMS service?

Evolved Multimedia Broadcast Multicast Service (eMBMS) extends existing LTE/EPC with an efficient **point-to-multipoint distribution** feature, enabling multiple users to receive the same content simultaneously. With eMBMS **operators can offer different services based on service type** (live or non-real time), **location** (venue-specific, local, regional, national), **quality** (bitrate, QoS), and **time of day/duration**.

Spectra2 LTE can simulate millions of UEs and can simulate video upload/download operations easily enabling you to test any eMBMS service scalability.

How Spectra2 LTE can help ?

1. Testing MBMS Coordinating Entity (MCE) functionality and capacity
2. Testing MBMS Gateway functionality and capacity



Interested in the use cases seen in this eBook and want to learn more? No problem! We'd be happy to talk to you.

USA :

[James Lommen](#)
[Mark Federowski](#)
[Jim Wright](#)

+1 301.590.4773
+1 301.590.7964
+1 469.330.4051

EMEA & LATAM :

[Martial Gruyer](#)

+33 787.027.079

India and Rest of Asia:

[Mike Erickson](#)

+1 469.330.3718

China :

[Fiona Zhao](#)

+86 139.0113.5002

Japan:

[Kazunori Omori](#)

+81 3 6714 3096