Using Location Intelligence to Maximize Lives Saved

Delivering the Highest Accuracy Caller Location for Emergency Services

SS8®

Securing Societies Always

Executive Summary

Every life counts, and to save as many as possible emergency services must be able to dispatch the appropriate rescue teams to a caller as fast as possible. To achieve this effectively, they need to identify the location of emergency callers quickly, accurately, and reliably.

Additionally, Emergency services must be able to determine a caller's location automatically, without any input from the caller. In emergency situations, callers may not be able to provide their exact location for various reasons – they may not know it, may be too panicked or injured to provide it, or may be in a hostile situation and unable to communicate.

As over 75% of emergency calls now come from mobile phones, many countries have mandated mobile network operators (MNOs) to provide an emergency caller location service.

This paper reviews the top ten emergency caller location and solution deployment challenges facing MNOs. It also demonstrates how SS8 addresses them to help maximize lives saved by rapidly, reliably, and efficiently delivering the highest accuracy emergency caller location.

Top 5 Call Location Challenges

1. Lack of accuracy
2. Lack of reliability
3. Not fast enough
4. Limited population coverage
5. Limited location auditability

Top 5 Deployment Challenges

1. Technology is network dependent
2. Lack experience in complex deployments
3. Not scalable
4. Technology limits use cases
5. Lack of experienced customer support

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Emergency Location Solution Necessities

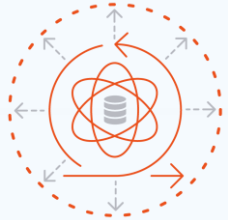
Regulatory compliance for emergency caller location helps avoid penalties that can be several times the cost of the available solutions – one MNO was fined $19.5 million for non-compliance in 2021. But to meet the highest and strictest emergency caller location requirements and deliver the most accurate location, network- and device-based data, like AML, must be combined. The information must be available anytime, anywhere, in real time, and include full population (e.g. any device, including roamers). Additionally, comprehensive location audit capabilities provide accountability.

Improved accuracy can reduce rescue times, increase survival rates, and save billions in emergency response costs according to the European Emergency Number Association (EENA). Flexible, future-proof solutions that offer additional benefits like lawful intelligence compliance help MNOs maximize their investment.

Solving delivery challenges with seamless, cost-effective, and future-proof deployments means delivering and updating flexible, network-independent platforms without disrupting normal business operations. These platforms must support 5G and next generation emergency communications while supporting additional uses like public safety warnings, track & trace operations, lawful intelligence, and commercial opportunities.

Location Solution Necessities

Meet strictest location requirements



Flexible and future proof design

Offer device-based location technology

Cost effective, ready-to-use solution

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Top 5 Emergency Caller Location Challenges

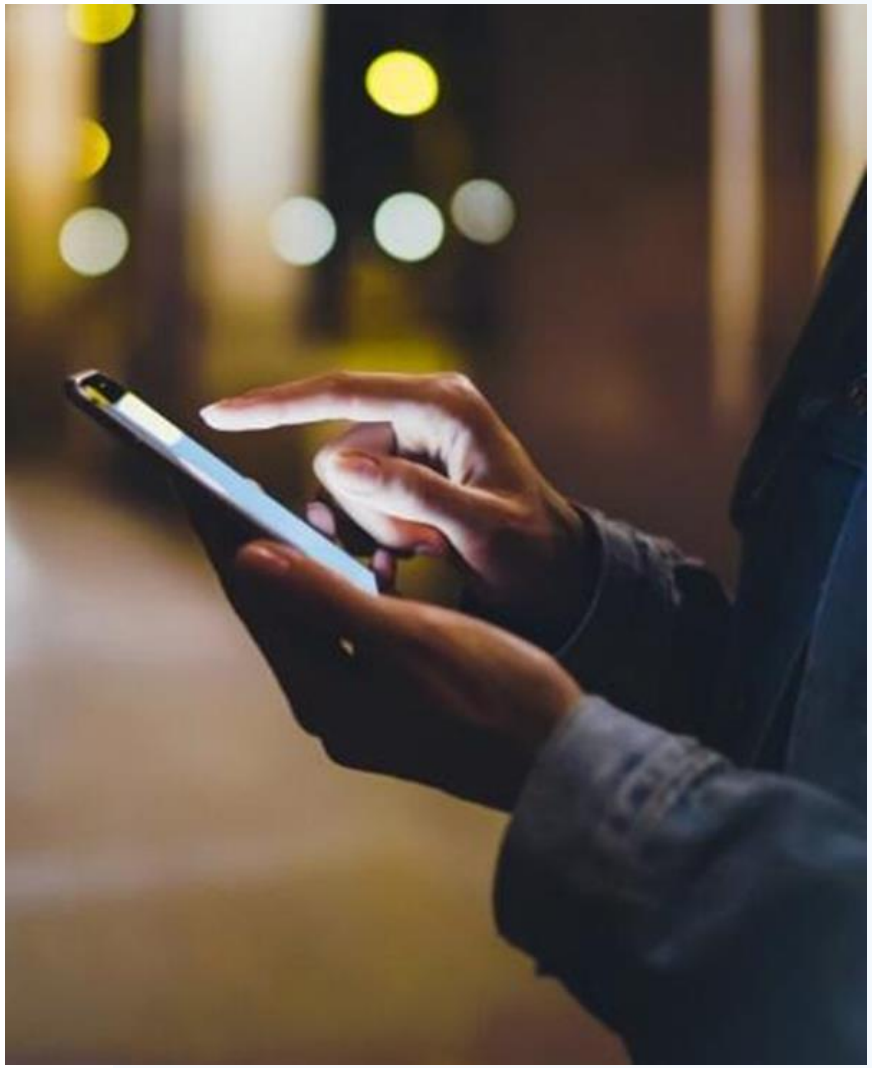
Achieving automatic caller location that is accurate, reliable, and fast is a difficult task. Many emergency services depend on technologies that limit effectiveness and hinder their mission in one of the five challenge areas:

LACK OF ACCURACY:

Technologies that rely on cell tower location can result in accuracies between 200–500m in dense, urban areas and 1–20km in rural areas. The lack of precise caller location can delay emergency services or even make it impossible to find the victim. According to EENA, each year this results in emergency mobile calls taking longer to locate than fixed calls and about 300,000 victims suffering a delay of at least 30 minutes.

LACK OF RELIABILITY:

Device-based locations that rely on the Global Navigation Satellite System (GNSS), Global Positioning System (GPS), or Wi-Fi may be unavailable or inaccurate due to lack of satellite coverage or out-of-date Wi-Fi location information. Handset cell-based information is often crowd sourced and may not reflect the current configuration of the mobile network. In some countries, up to 66% of emergency calls fail to be located automatically.



Top 5 Emergency Caller Location Challenges - Continued

LACK OF SPEED:

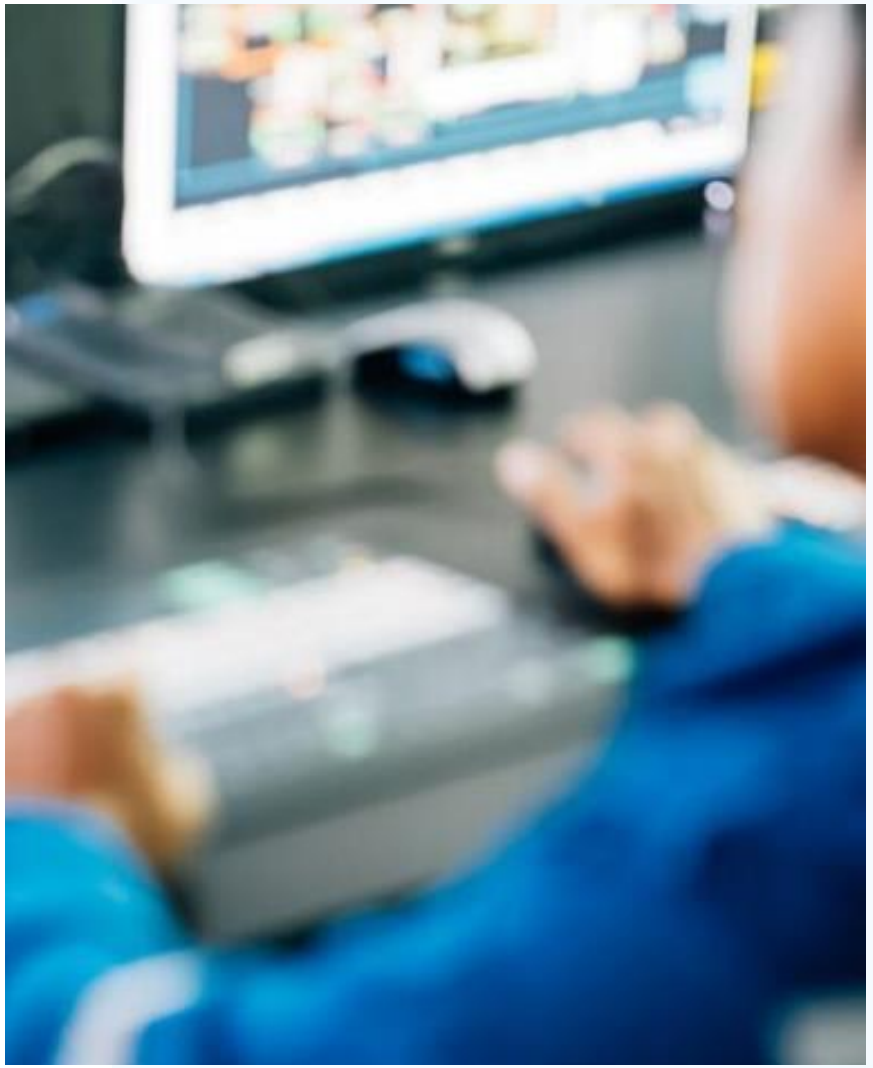
A slow emergency response can make a critical situation tragically worse. The location of the caller needs to promptly appear on the screen of the public safety answering point (PSAP) agent who answers the emergency call so they can dispatch the right emergency responders to the right place, without delay. EENA states that a reduction in response time by 1 minute can improve survival odds by 24% for certain pathologies, but GPS satellites can take up to 2 minutes to deliver a first position calculation – and multiple such positions are required for reliable accuracy.

LIMITED POPULATION COVERAGE:

Emergency services must be able to locate anyone in need, regardless of their devices. However, device-dependent technologies like AML only work for smartphones – which excludes a material portion of the population and do not inherently support inbound roamers.

LIMITED LOCATION AUDITABILITY:

Ensuring the integrity and quality of location information is important to emergency and law enforcement organizations, yet device-based locations are ‘best effort’ without a reviewable trail of inputs used to generate results.



Top 5 Deployment Challenges

Caller location solutions need to be flexible and prepared for emerging and future technologies like 5G, NG112, NG911, and IoT. If they aren't, it affects the seamless delivery of the service and makes the evolution to new networks difficult and costly:

COMPLEX DEPLOYMENTS:

Location solutions may be difficult to integrate and make an emergency responder's or MNO's network environment more complex. Custom-built solutions, network technology-dependent solutions, or fragmented solutions can all complicate location technologies. Such solutions often require unique expertise and individual updates whenever a new industry standard is introduced – like NG112, for example. Emergency responders and MNOs need a single solution that centralizes location capabilities and easily integrates in the mobile network.

NETWORK TECHNOLOGY-DEPENDENCE:

Solutions designed for older networks – or specific network types – or those specific to a single vendor can be problematic. Many MNOs are planning to evolve to 5G and run heterogeneous networks ranging from 2G to 5G, with a mix of network equipment vendors.

Top 5 Deployment Challenges - Continued

NOT SCALABLE:

Older solutions may struggle to cope with the surge of data generated by IoT devices and 5G networks. Today's location solutions need to easily scale to support high volumes of data, next generation emergency communications like NG112, new device technologies, and new compliance requirements.

LIMITED USE CASES:

Location intelligence – including information beyond just caller location – may be required by emergency services, other public safety agencies (e.g. law enforcement, public warning), or for MNOs' commercial purposes. Platforms that cannot meet these varying needs make it necessary to introduce new solutions, adding time, complexity, and management overhead for both MNOs and emergency services.

LACK OF EXPERIENCE AND CUSTOMER SUPPORT:

Effective location technologies require vendor expertise and a customer-focused team, particularly when strict accuracy requirements are mandated.

Addressing Emergency Services and MNO's Challenges

The limitations of some location technologies can hinder emergency services MNOs. Flexible solutions based on network location – the most reliable positioning data – that also incorporate device-based location can address all the challenges above. SS8's expertise allows us to deliver the highest audited location accuracy worldwide.

LocationWise is a network-based location platform that can also leverage device-based location data to rapidly and reliably deliver the most accurate caller location. The solution uses highly precise algorithms – including our patented Accuracy+ algorithm – to extract data from the network and locate mobile devices.

The platform also continuously evaluates the quality of the location information to automatically improve accuracy and is flexible enough to work for any mobile device, on any network, anywhere, anytime. It helps emergency services save the maximum number of lives and MNOs comply with regulatory mandates with minimum disruption, time, and cost.

LocationWise is a standards-based software platform that encompasses:

- GMLC (Gateway Mobile Location Center) for standard cell-ID accuracy
- SMLC (Serving Mobile Location Center) for sub-cell high accuracy
- Patented Accuracy+ algorithms for highest accuracy
- Bulk (Passive) nodes for mass location
- Optional, ready-to-use AML solution

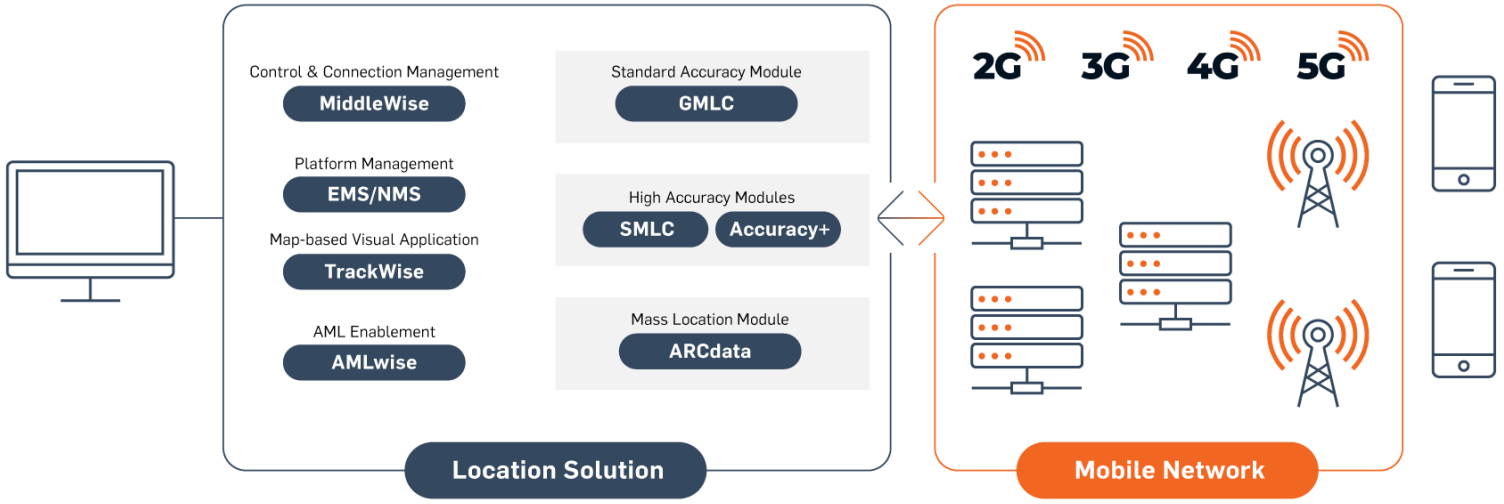
Addressing Emergency Services and MNO's Challenges - Continued

AMLwise is a ready-to-use solution to enable AML rapidly and cost-effectively. AML is a protocol embedded in smartphones that can leverage the device's GNSS, Wi-Fi, or Cell-ID information to send the caller location to the PSAP.

AMLwise is an optional solution that helps emergency services receive and decode AML data rapidly to improve caller location accuracy and response times. It is a ready-to-use, cost-effective solution that can be rapidly deployed or securely hosted, minimizing time and cost.

The product fully integrates with Command and Dispatch (CAD) software and other third-party systems used by PSAPs, which further facilitates deployments.

Since 2016, Creativity Software, a wholly owned subsidiary of SS8, has been engaged by the European Commission to design, test, and deploy AML for seven member states as part of its HELP112 Phase 1 and Phase 2 projects. This expertise and experience allows us to support emergency services and MNOs in enabling AML and interfacing with smartphone manufacturers like Google and Apple.



Why a Network-Based Solution is Essential

AML information helps improve emergency caller location accuracy to within 50m, but on average, 40% of AML calls fail to be located (up to 66% in some places) according to EENA. Often, this is because the PSAP does not have the proper technology. This data is also only available from AML-enabled smartphones, which many people don't have, even today:

- 45% of adults in emerging economies and up to 30% in advanced economies don't have an AML-enabled smartphone (Pew Research Center), including the elderly, disadvantaged, and vulnerable.
- 'Non-smart' phones are on the rise, with 1 billion units projected to be sold in 2021, up from 400 million in 2019. Only 1.4 billion smartphones were sold in 2021, a 12.5% decline from 2020.
- In 2021 in the UK, 1 in 10 mobile users had a 'non-smart' phone.

Additionally, AML does not inherently support roaming. In a global world, this leaves foreign traveler's and those on legacy networks vulnerable in emergency situations. As such, deployments need to be backed by a network-based location solution as a safety net and to provide validation of AML/device-based location.

SS8 provides location information even when AML fails, with full population coverage. Our network-based solution integrates with any AML solution to rapidly and reliably deliver the most accurate location information for any mobile device, on any network, anywhere, anytime.

The Critical Importance of High Accuracy: EENA Real-World Trials

As part of the Help112 phase 1 initiative, EENA ran a pilot project with real-world scenarios that demonstrated the critical benefits of higher accuracy in emergency services:

TIME:

30 seconds can be saved on average on every mobile emergency call, and over 1.5 minutes on average in rural environments.

TIME:

Search and rescue times can be reduced by up to 4.5 hours.

COST:

Cost benefits of 55 to 100 billion Euros over 10 years (2017–2027) due to a more efficient deployment of emergency services resources, a significant reduction in the time to find an emergency caller, and a lower cost of treatment for victims.

LIFE:

During a trial in Lithuania, a seven-year-old boy found his father unconscious and called emergency services but did not know his location. The Cell-ID location gave the PSAP a radius of 14km, but thanks to the trial the high-accuracy AML location was available. This allowed the ambulance to be dispatched without delay to treat the patient for a seizure, saving a life that would otherwise have likely been lost.

Why Location Accuracy Matters

Time is saved during calls and by responders

Efficiencies save money

Faster response time can save lives

Complying with the Highest and Strictest Emergency Caller Location Requirements

ACCURACY:

SS8 consistently delivers the highest location accuracy in the world, as proven by independent audit against the highest and strictest standard worldwide. LocationWise leverages both network and device (e.g. AML/GPS) location data to enable emergency services to reach victims without delays due to wide location ranges. As 5G is deployed around the world, the number of cell sites will multiply significantly, empowering us to bring even higher location accuracy to emergency services.

RELIABILITY:

By leveraging both network and device location data, LocationWise always produces the most accurate location data available and works even when the device location technology fails – which happens 40% of the time on average, according to EENA. The solution automatically delivers the emergency caller location without any action by the analyst, ensuring that all callers are duly located and rescued anytime, anywhere.

SPEED:

LocationWise is a powerful active location engine that generates the emergency caller location in real time. By the time the call is answered, the location is already available. The improved data capture speeds of 5G further accelerates this process.

Complying with the Highest and Strictest Emergency Caller Location Requirements - Continued

POPULATION COVERAGE:

LocationWise is device-agnostic and works for old, new, and future devices, ensuring that all emergency callers, including roamers, can be located and rescued. Unlike device-based location technologies such as AML, which are only available for smartphones and can exclude roamers, the solution provides full population coverage.

AUDITABILITY:

LocationWise actively monitors the performance of the location ecosystem in real time and identifies changes within the network that adversely affect location accuracy. A comprehensive audit trail can be retained to allow detailed analysis of any location generated, including inputs used, and cell information is continuously validated prior to utilization to ensure accuracy.

Maximizing Value for Emergency Services and MNOs

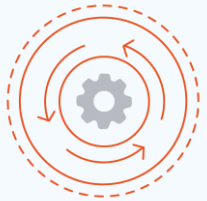
LocationWise is a flexible, seamless, and future-proof caller location solution that meets the current and evolving needs of emergency services and MNOs. We help MNOs fully comply with emergency services regulatory obligations while minimizing disruption, time, and cost with our easy-to-integrate solution and extensive experience.

DEPLOYMENT:

LocationWise is built for ease of deployment, ensuring continuity of service while minimizing time and costs. This enables the solution to be delivered effectively and without interruption to the MNO's core business and resources.

TECHNOLOGY:

LocationWise is a 3GPP-compliant solution that is independent of any specific network technology or vendor. The solution works across 2G, 3G, 4G and 5G, easily supporting network evolution and eliminating the need for multiple systems for different network infrastructures. This makes deployments, updates, and upgrades easier, faster, and cheaper.

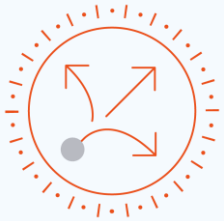


Non-disruptive deployments

Cloud ready with remote deployment option

Centralized deployment (or not)

Unified location platform



Seamless replacements

Maximizing Value for Emergency Services & MNOs - Continued

SCALABILITY:

LocationWise is designed to easily scale to meet the evolving requirements of emergency services and MNOs:

- Integrates with next generation emergency services networks (e.g. ESInet) to enable callers to be located within next generation emergency infrastructures such as NG112 (Europe), NG911 (USA) and NG999 (UK).
- Locates emergency IP calls from any device or app, including laptops, pads, smart speakers (e.g. Alexa), smart TVs etc. The solution supports 4G IMS networks with LRF/RDF nodes required to handle emergency calls on LTE networks (VoLTE) as well as VoNR (Voice over New Radio) to locate emergency calls over 5G networks.
- Optimized for the growing volume of data and devices driven by 5G and next generation emergency communications.

Extended Use Cases

Public Warning with Location Insights

Cell Broadcast sends alerts to millions in seconds while Traceable Disaster Alerts further allows movement tracking and follow-up messages to help manage disasters effectively.

Track and Trace

End-to-end solution enables governments to effectively track, trace, alert, geofence, and analyze the movement of populations to better respond to pandemic's and control the spread of diseases.

Law Enforcement

LocationWise helps in fighting crime with real-time tracking, bulk location to identify a suspect's location, historical data to gain more intelligence, geofencing and alerts to secure sensitive areas.

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About the Authors

With 18 years in Technology/Telecom marketing, Corine Suscens has been developing leading edge thought leadership content for the industry. During her career, Corine has helped leading companies to explain their technical offerings in order to maximise industry understanding. She has written several whitepapers tackling key business challenges that the industry has been facing. Corine currently leads the marketing department at Creativity Software, a wholly owned subsidiary of SS8, supporting the company's growth and developing thought leadership marketing globally. Corine holds a Masters in Management from Grenoble Ecole de Management.
You can learn more about Corine on LinkedIn at
https://www.linkedin.com/in/corines/

Stuart Walsh is a consultative technical sales leader with over 25 years of experience helping customers deliver solutions for success. As the leader of the product division at Creativity Software, a wholly owned subsidiary of SS8 Networks, Stuart is passionate about introducing next generation solutions and services to network operators and enterprises and driving business growth. Stuart also has a depth experience in voice and data applications for both Enterprise and Service Provider customers. You can learn more about Stuart on LinkedIn at
https://www.linkedin.com/in/stuart-walsh-131a29/

About SS8 Networks, Inc.

As a leader in Lawful and Location Intelligence, SS8's goal is to help make societies safer. Our commitment is to extract and analyze the critical intelligence needed by law enforcement, intelligence agencies, and emergency services so they have the best information possible with real-time visibility. We help mobile network operators to achieve regulatory compliance with minimum disruption, time and cost.

Xcipio® mediation platform meets the very high demands of 5G volumes of intercepts and provides the ability to transcode (convert) between lawful intercept handover versions, and standard families.

Intellego® XT monitoring and data analytics portfolio is optimized for Law Enforcement Agency's to capture, analyze and visualize complex data sets for criminal investigations in real-time.

LocationWise delivers the highest audited network location accuracy worldwide, providing active and passive location intelligence for law enforcement, emergency services and mobile network operators' requirements.

For more information regarding SS8's mediation and interception products, please visit **www.ss8.com** or email us at **info@ss8.com**. Additionally, you can follow us on Twitter at @SS8 or on LinkedIn at **https://www.linkedin.com/company/ss8/**.

SS8 Networks Inc.
750 E. Tasman Drive
Milpitas, CA 95035

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