

Sonim in Public Safety

Informational Brief

"Rugged Answers to Rugged Questions"

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Executive Summary:

Now that AT&T has officially been awarded a contract from FirstNet to build a nationwide, interoperable public safety broadband network, public safety professionals face an uncharted and unprecedented path regarding the evolution of their public safety communications technology.

This informational brief intends to provide a variety of Rugged Answers to Rugged Questions that Sonim's public safety strategy team has identified as most important for Public Safety Stakeholders and Industry alike.

ABOUT SONIM TECHNOLOGIES:

Sonim Technologies provides ultra-rugged solutions designed specifically for professionals in the public safety and defense space. The Sonim solution includes mission critical LTE handsets, applications and a suite of public safety-grade accessories, collectively designed to increase the productivity, accountability and safety for today's first responders. Sonim's commitment to delivering the most reliable and mission critical handset is amplified by our industry-leading, 3-year comprehensive warranty, which has redefined user expectations for ultra-rugged technology placed in the hands of front-line first responders. The company is headquartered in San Mateo, Calif., and offers its products with mobile operators around the world.

What is Sonim's background and involvement in the public safety communications market?

Since 1999, Sonim has been solely focused on providing mobile solutions for those who work in extreme, hazardous and/or isolated environments, including public safety. Sonim started with a Push-to-Talk (PTT) solution that enabled instant, reliable communication and was built to be used on traditional cellular networks to compete with radios and an iDEN network that had been designed specifically to support PTT communications.

As the demand for PTT technology increased, Sonim quickly recognized that there was a lack of ultra-rugged hardware to support the often mission-critical nature of PTT communications. Using a law enforcement officer as an example, he or she requires a reliable PTT experience, along with a rugged device that is durable in extreme conditions, has long battery life, powerful audio and is properly accessorized. In the early 2000s, all the available devices were either consumer- or white-collar enterprise oriented. This revelation led to Sonim designing and manufacturing its own handsets to better meet the demanding needs of the individuals who work in the most arduous of environments.

When Sonim set out to build the world's most rugged handset, there were no industry standards, so the company created them. Based on more than fifteen years of feedback from customers who pushed their devices to their limits each day on the job, Sonim created a set of Rugged Performance Standards that have become the core tenants of our engineering:



In 2008, Sonim launched its first ultra-rugged handset, the XP1. The ultra-rugged phone proved itself many times over by increasing productivity and efficiency. Using the XP1 as a benchmark, Sonim's leadership spent thousands of additional hours gathering feedback from first responders in the field and at the operations level to help address their specific needs. This extensive research gave rise to Sonim's life-reliable XP family of products. Sonim has launched more than twenty different ultra-rugged handsets over the years

culminating in the current generation of Android-based LTE feature phones and smartphones, including the XP7, which is the first Band Class 14 device launched with a North American mobile operator.

Today, Sonim is recognized as a leader in the Band Class 14 space and "is as close to indestructible as a handset can get" <u>as benched tested by Lindsey J. Bertonmen at PoliceOne.com</u>. The Sonim XP7 handsets have been leveraged in virtually every public safety band class proof-of-concept since 2015. Sonim also actively partners with application and technology leaders; like Intrepid Networks, to develop robust communications solutions for public safety. By combining purpose-built public-safety-grade LTE handsets and ultra-rugged accessories with customized applications and services, Sonim offers a comprehensive communications solution that increases first responder effectiveness and safety.

What is Sonim's in the public safety LTE value chain?

Sonim has defined and built the next-generation, mission critical Band Class 14 LTE handset for public safety. The ultra-rugged XP7 is deployed and proven within many public safety agencies today.

For years, Sonim has been an active participant in early builder deployments of LTE-based, Band 14 network solutions, and has supported dozens of proof of concept initiatives, including recent "Big Games," the Albuquerque International Balloon Fiesta, the 2015, 2016 and 2017 Tournament of Roses Parade and the 2015 Papal Visit. In addition, Sonim devices have been tested and validated at both the NIST and FirstNet labs. The XP7, a purpose-built, ultra-rugged LTE handset, is the industry leader in mission critical-grade handset standards, and operates on Band Class 14 and AT&T. Additionally, the XP7 is certified on Verizon and other North American carriers.

These ultra-rugged LTE Android smartphones have the world's longest battery life and are an essential component of Sonim's mission critical solution. The XP7 handset is outfitted with features such as a glove touch screen that can be viewed in direct sunlight. Additionally, the Sonim XP7 features a 103-dB loud speaker with noise cancellation, is drop-proof (up to six feet), meets Military Specification IP68/69 for water and particle intrusion, and comes with an industry-leading 3-Year comprehensive warranty. Sonim's solution also includes a full suite of public safety-grade accessories, including a hands-free PTT in-vehicle kit, barcode scanners, holsters, and Bluetooth and cable connected PTT mics. In addition, Sonim is currently engaged in research and development projects for additional public safety accessories.

By working closely with industry research working groups, public safety practitioners, and industry standards groups, Sonim continues to innovate in the ultra-rugged handset and accessories space. The XP7 embodies this collaborative effort: a next generation, purpose-built platform capable of delivering Mission Critical Voice (MCV), video and data and a host of ultra-rugged applications to the mobile public safety professional.

Can Sonim shed some light on key trends & recent developments in public safety LTE?

As an ultra-rugged technology manufacturer, Sonim owns a unique perspective of the public safety LTE ecosystem. As a company, Sonim continues to be driven by its 12 Rugged Performance Standards (RPS), as well as feedback from public safety. It is through that lens that we offer the following observations:

• Public safety is in the process of defining new LTE mission critical standards for mobility devices to front line first responders that find themselves in austere and often harsh environments. The

application and edge device standards are unique but complimentary to the LTE Network & 3rd Generation Partnership Project (3GPP) standards defined in LTE Releases 11-15 and beyond.

- There will continue to be a high demand for devices with a large battery capacity. These devices must not only last the length of a shift without a recharge, but must also be able to power separate, standalone accessories, including connected IoT Sensors that will comprise a first responder's personal area network.
- Land Mobile Radio (LMR) networks will be augmented by the introduction of LTE-based hardware and software that will allow users to communicate with LMR users via a network-based or over-thetop (OTT) PTT solution. Mission Critical Push-To-Talk (MCPTT) will evolve into a public safety standard on LTE networks over time. In fact, agencies today are already pioneering the system integration required to bridge LMR with LTE as standards are developed and implemented.
- Given the differences in wattage output between LMR and LTE devices, one component of LMR communications that has been slow to emerge in the LTE space is the concept of "direct mode" or "talk around," where radios are able to communicate directly in the absence of network connectivity. Proximity Services, or ProSe in the LTE space, is a maturing capability that holds promise for public safety to one day communicate directly with one another in the absence of a network connection. Work is currently underway in many areas, to explore this capability in the context of LTE-based devices.
- UAV/Drone technology is gaining higher levels of focus for expanding situational awareness. Agencies are piloting LTE enabled UAVs/Drones to live stream video to on-scene first responders and back to emergency operation centers (EOCs).
- Across functional disciplines, public safety agencies (Law Enforcement, Fire, EMS, and Federal departments) are adapting standard operating procedures (SOPs) as they become more familiarized with broadband technologies. Notwithstanding these department gains, public safety is also faced with defining emerging broadband-based policies that explore the role of first responders as content creators, and help define new responsibilities for first responders at large-scale events.
- The evolution of consumer LTE networks to 5G, and the resulting technology that will enable this transition including small cells will play a significant role in the development of new and expanded capabilities for public safety.
- As IoT and smart cities evolve, and body worn cameras (BWCs) become more prevalent, public safety
 will have access to data at a level never experienced in the history of this profession. How this data
 will be parsed, shared across agencies, and leveraged will be an integral topic discussion for
 departments nationwide. Access to computer- and self-generated data, coupled with the rise of data
 analytics and intelligent systems will yield huge gains in the field of predictive policing and other first
 responder activities. How this technology pairs with the FirstNet network will determine added value
 to the public safety professional, in terms of receiving accurate, actionable intelligence.

Why is there so much discussion on LMR-to-LTE PTT interoperability?

There are a couple ways to tackle this question:



First: Public Safety relies on Land Mobile Radio technology for mission critical voice communications and that will not change for the foreseeable future.

In 2007, the launch of a true mobile smartphone device with first generation apps, coupled with the deployment of wireless 2G/3G in-vehicle routers offered the first responder a true "in-hand" broadband and application platform.

But, it wasn't until the late 2000s when commercial wireless cellular companies reached equitable 3G coverage in metro and rural areas that public safety began augmenting LMR communications with cellular voice as a "mission support" technology. As smartphones, tablets, and in-vehicle routers became more prevalent with faster 3G and 4G networks, public safety naturally added these enabling tools to support a variety of life-safety and efficiency-related operations. For example, in-vehicle routers supported dispatch communications to "run" license plates, scan driver's licenses, and perform background checks. These same tools helped usher in paperless workflow operations and the administration of citations that immediately were uploaded to a central database.

Despite the incredible advancements in commercial mobile technology over the last decade, the solutions that run on commercial/consumer smartphones remain "mission support" to that of mission critical voice over LMR networks.

There is a great white paper on our Sonim public safety website which discusses the Push-to-Talk over Cellular (PTToC) to LMR is discussed: <u>"PTToC Integrated LTE and LMR Communications Success in the Mainstream"</u>.

Second: In 2017, bolstered by FirstNet's contract with AT&T to deploy the Nationwide Public Safety Broadband Network (NPSBN), we find ourselves on the brink of a new era of technology usage by public safety. This new era will see an exponential increase in demand for broadband accessibility along with a new generation of public safety applications and technology. These include situational awareness apps, the connected first responder, devices that can "talk" with IoT equipment sensors, connected vehicles, license plate readers, electronic-citations, body-worn cameras, and biometric readers.

Third (last): Public Safety initially adopted cellular voice to augment LMR communications. Advances in 3G/4G wireless networks enhanced access to broadband applications, systems, and databases which were folded into department technology portfolios. Although the capabilities for LMR-wireless interoperability has been around for some time, only recently, as the end-to-end solution became a viable deployable technology with upgraded LMR Networks, advancements in PTT application platforms, and reliable ultra-rugged LTE handsets. Today, many forward-thinking public safety agencies and users are enhancing their broadband deployments with LTE PTT voice integration and interoperability into their LMR networks using donor radios (RoIP) or integrated consoles (ISSI / CSSI). These same agencies have come to realize that this technology path is an evolutionary one, and there are <u>viable models to back up the investment in this technology</u>.

What became evident in these early large-scale LMR-LTE deployments was that any LTE-based handset must have a large battery, run an intuitive, standard OS and include an easy way to provide PTT-based communications.

For years, public safety has relied on consumer-grade wireless devices (feature phones, tablets and smartphones) as secondary voice communications tools and primary broadband data tools. The community is now primed for widespread adoption of an LTE-based PTT solution that augments existing LMR communications. With this interoperability comes a focus on deploying "mission critical" standards into the public safety handset portfolio: LTE handsets at the user edge that can withstand the extreme environment these devices are exposed to during a shift.

The image below highlights the emergence of a new public safety device category aligning with mission critical equipment standards that are present in Land Mobile Radio handsets.

Public Safety Consumer Off the Shelf (COTS) convergence:



The National Public Safety Telecommunications Council (NPSTC) and many other organizations from Public Safety Communications Research (PSCR), National Institute of Standards and Technology (NIST), Association of Public Safety Communications Officials (APCO), and public safety technology vendors are working to capture, define and isolate requirements for Mission Critical Voice over LTE. <u>NPSTC has</u> explored the topic of Voice over LTE and has narrowed this feature to a set of common elements:

- ✓ Direct or Talk Around
- ✓ Push-to-Talk (PTT)
- ✓ Full Duplex Voice Systems
- ✓ Group Call
- ✓ Talker Identification
- ✓ Emergency Alerting
- ✓ Audio Quality

So, just what is "behind the screen" of the Sonim XP7 handset:

Sonim set out to build a mission critical-grade LTE handset for public safety, addressing some of the more immediate challenges that would be addressed in any broadband device. As technology evolves, public safety needs will change, but an ultra-rugged form factor that can augment existing LMR networks with an LTE overlay will continue to be an important feature set.

When Sonim's engineers set out to build the world's most reliable ultra-rugged LTE handset, they consulted with public safety and checked the boxes on edge device requirements to align with key elements of the definition of Mission Critical Voice and added a few additional ones that we previously covered in our 14 Reliability Product Standards (RPS). This matrix explores these combined factors:

✓ Direct Mode	/ Talk	Sonim is currently involved with public safety
Around		technology industry on LTE Direct and
		Narrowband Direct mode development which
		is setting the standards of our next generation
		mission critical platform.
✓ Push-to-Talk	/ Audio	Sonim XP7 is designed as an open Android OS
Quality		platform for the various PTT technology
		companies to leveraging APIs and SDKs. Our
		engineers designed a 1 watt 103db speaker
		ideal for PTT in loud environments.
✓ Full Duplex V	oice	Sonim device portfolio is certified on domestic
Systems		U.S. cellular carriers and multiple international
		carrier networks including FirstNet Band Class
		14.
✓ Group Call		Sonim XP7 is designed as an open Android OS
		platform for the various PTT technology

	companies to develop to leveraging API and SDKs.
 ✓ Talker Identification 	Sonim XP7 is designed as an open Android OS platform for the various PTT technology companies to develop to leveraging API and SDKs. Companies to develop to leveraging API and SDKs.
 Emergency Alerting 	Sonim built into the XP7 a red EA-Button
✓ Screen	Sonim built into the XP7 a 4-inch outdoor high visibility Blanview LCD Display with lower power consumption and superior sunlight readability. Our engineers even added glove touch usability in wet/dry conditions. <i>If the</i> <i>first responder is unable to functionally view</i> <i>or use the screen, the Mission Critical-nature</i> <i>of the phone falls short. Sonim recognized</i> <i>this design feature as a critical element for</i> <i>inclusion in its device engineering.</i>
✓ Battery Life	Sonim built into the XP7 a Dual Cell 4820mAh battery for heavy, real-world use. In practical terms, that means an ability to use the device for two or more shifts while running PTT, GPS tracking, apps, phone calls, email, wi-fi and Bluetooth accessories without the phone needing a charge. <i>If the first responder is</i> <i>always searching for power to charge, and</i> <i>cannot rely on a consumer smartphone</i> <i>battery life to get through a single shift, the</i> <i>Mission Critical – nature of the phone again</i> <i>fails. Sonim recognized this as a critical</i> <i>element for inclusion and delivered a battery</i> <i>to get through two full shifts.</i>
✓ IP68/69 / MIL810G	Normal-to-extreme usage should not
Certified / 6.5' Drop	materially impact the overall level of device
Test	performance. Sonim engineers designed an
	ultra-ruggedized handset with a 3-year
	manufacturer's guarantee.

What are the top public safety priorities?

Sonim is highly engaged with public safety nationally. In 2017, our travels and conversations at state, local and national events have yielded the following consistent themes that are of the highest concern for public safety professionals:



Can Sonim give some examples of your current engagements/involvement with PSCR-NIST?

PSCR is developing multiple technology roadmaps that present the highest-priority technological trends, capabilities, gaps and R&D opportunities facing public safety over the next 20 years. Each PSCR roadmap focuses on a specific emerging technology sector that has the potential to greatly increase the response capabilities for public safety once it migrates to the NPSBN (FirstNet).

For each technical track, PSCR commissioned a diverse stakeholder working group made up of technology experts and end users from industry, academia, public safety and all levels of government to identify the challenges and opportunities associated with introducing these new technologies into public safety operational environments. Thus far, PSCR published a Location-Based Services R&D Roadmap Report, built upon the recommendations put forth in this document at the October 2015 Location-Based Services Summit, and commenced a second stakeholder working group focused on public safety's enhanced use of Data Analytics. These parallel efforts will prioritize the technological needs of public safety and outline actionable steps that the community can pursue to better integrate emerging technologies like Location-Based Services and Analytics in mission critical operations.

Sonim Technologies participates in several PSCR initiatives including the most recent draft of the Public Safety Enhanced User Interface R&D Roadmap. Along with our participation in the Data Analytics and Location Based reports, Sonim continues to contribute both at the technical and business level as subject matter experts along with our industry colleagues to help promote initiatives in a working group environment that will help identify key areas in how the NPSBN (FirstNet) can be optimized and to look at the potential capabilities of what the network can achieve for the First Responder community.

Can Sonim give some examples of your involvement with early BTOP Band 14 network deployments?

Sonim is very actively engaged with public safety; conducting over 100+ trials/pilots over the last 3 years (currently active or concluded). Including on-going support for the Firstnet early Band 14 network deployments trials with the State of New Jersey, Harris County, Texas, Adams County Colorado, the State of New Mexico, and the Los Angeles Regional Interoperability Communications System (LARiCs). A more in-depth look at Sonim's role with some of these pilots can be found on our website.

Is there a single informational resource, with the latest news, information, and technology related to FirstNet and Public Safety that you recommend?

Yes! <u>http://allthingsfirstnet.com/</u> is a public safety specific website dedicated to the latest analysis from industry. It also serves as the new website for Public Safety Advocate © Andy Seybold.

If you're looking for information specific to public safety-grade LTE handsets, be sure to read this article: <u>What to Expect When You're Expecting (A New LTE-Based Device For Public Safety)</u>



LONGEST BATTERY LIFE 40 hours of talk time 1000 hours of standby time

ACCESSIBLE SCREEN / KEYS Touchscreen use with heavy/wet glove Large accessible buttons

POWERFUL AUDIO 103 dB speaker performance Noise cancellation

PROTECTION FROM MICRO PARTICLES Rated IP 68 No micro particle intrusion

WATERPROOF Rated IP 68 / IP 69 Submerge 30 minutes under water Resistant to high pressure wash

DROP/IMPACT RESISTANT Resistant to 6.5 foot drop onto concrete Impact resistant from any angle

SHOCK / VIBRATION RESISTANT Withstands sudden shocks up to 30 G and vibrations from 5 Hz to 500 Hz

TEMPRATURE RESISTANT Fully operational from -4° F to 131° F

RESISTANT TO EXTREME PRESSURE Withstands up to a ton of metric pressure

PUCTURE RESISTANT Corning® Gorilla® Glass Generation 2 Withstands up to 4 J of impact energy

RESISTANT TO OILS / CHEMICALS Resistant to petroleum oils Resistant to corrosive solvents

3-YEAR COMPREHENSIVE WARRANTY Industry leading warranty Covers accidental damage Sonim – Ultra Rugged Mission Critical Accessories:

XPand Barcode Scanning, Battery Pack

Multi-bay Phone & Battery Charging

In-vehicle Pro-install & Passive Kits

Dispatch

Wired & Wireless PTT Headsets & RSMs

Carrying Solutions

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Steven at the		Glove Touch Screen
		High Visibility display in direct sunlight
the second se		LTE
a 19.		Android [™] 5.1.1 Lollipop
		One Touch Push-to-Talk
- a (P)		WiFi 802.11 $a/b/g/n/r$ with hotspot feature
Core/Platform/Functions	Operating System	Android 5.1.1 Lollipop
	Chipset	MSM8926 1.2 GHz Quad core
	Band	FDD-LTE B2/B4/B5/B7
		B1/B8/B12/B14/B17
		UMTS 850/900/1900/2100 MHz
		GSM 850/900/1800/1900 MHz
	Antenna	MIMO antenna for LTE
	WiFi	802.11 a/b/g/n/r with hotspot
	Memory	16 GB Internal storage / 1 GB RAM
		User Memory: 12GB
	Applications	Enhanced Push-to-Talk, Google Play
Connectivity	Bluetooth	BT 4.0/BLE (low energy)
	SMS, MMS (text, image, audio,	Support SMS and MMS
	video)	11
	GPS. NFC	GPS, GLONASS, NFC
	Languages supported	English, French, Chinese, Japanese, Korean
	Email Client	EAS, Gmail, POP3, IMAP
Battery	Capacity	Embedded 4800mAh
	Battery life (Standby, Talk)	Standby: 1000h / Talk: 40h
Physical Characteristics	Size	137mm x 72.1 mm x 20.8 mm
	Weight	290 g
	Certifications	FCC, PTCRB, IEEE1725, CEC, Bluetooth
		SIG, WFA, IC
	Dedicated Keys	PTT key, Alarm key, Power key
	Ports	3.5 mm audio connector/magnetic USB
		connector/12pin connector
Display	Size	4.0"
	Туре	Corning Gorilla Glass with glove touch,
		blanview display
	Resolution	WVGA (480x800)
	Outdoor Visibility	Yes
	Capacity	16.7 M color
Audio	Microphone	Dual mic solution with noise cancellation
	Speaker	19mm loud speaker with Gore protective
	Speaker	vents output up to 103 dB
Multimedia	Audio Formats	$\frac{1}{10000000000000000000000000000000000$
Waitificatu	rudio i officia	NB/WB
	Video Formats	Support AVI MP4 3GPP
	Media Player	Android native +GMS
	FM Radio	
	Camera	8 MP auto focus rear 1MP fixed focus front
	L FD Torch Light	Vec
Inhox Accessories		Wall charger
		Magnetic USB Cable
		Multi tool
		Iviuiti-t001

RESOURCES

The new Sonim XP7 handset: Capabilities that cops will appreciate on duty The XP7 is as close to indestructible as a handset can get Mar 27, 2017 By Lindsey J. Bertomen PoliceOne.com <u>https://www.policeone.com/police-products/communications/radios/articles/321616006-The-new-Sonim-XP7-handset-Capabilities-that-cops-will-appreciate-on-duty/</u>

Sonim Band 14 Pilots: http://www.sonimtech.com/publicsafety/pilots_sonim.pdf

Push-To-Talk over Cellular: Integrated LTE and LMR Communication Success in the Mainstream Prepared by: Andrew M. Seybold Andrew Seybold, Inc. <u>http://www.sonimtech.com/publicsafety/seybold-wp-ptt-3-10-2017.pdf</u>

What To Expect When You're Expecting (A New LTE-Based Device For Public Safety) http://allthingsfirstnet.com/what-to-expect-when-youre-expecting-a-new-lte-based-device-for-public-safety/

Integrated LTE and LMR Communication Success in the Mainstream by Andrew Seybold © Andrew Seybold, Inc. 2017 http://www.sonimtech.com/publicsafety/seybold-wp-ptt-3-10-2017.pdf

Radio Interoperability Best Practices – NPSTC Report January 2017 <u>http://www.npstc.org/download.jsp?tableId=37&column=217&id=3853&file=NPSTC_Radio_IO_Best_Practice_O_verall_Report_Final.pdf</u>

Mission Critical Voice Communications Requirements for Public Safety - NPSTC <u>http://www.npstc.org/download.jsp?tableId=37&column=217&id=2055&file=Mission%20Critical%20Voice%20F</u> <u>unctional%20Description%20083011.pdf</u>

Recent events underscore significant market impact of LMR-LTE convergence *May 8, 2017* by <u>Donny</u> <u>Jackson</u> in <u>Urgent Matters</u> <u>http://urgentcomm.com/node/50396?page=1</u>

Expanding Coverage and Capacity through Land Mobile Radio Network Interoperability https://www.business.att.com/content/whitepaper/push-to-talk-white-paper.pdf

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Fairfax County: Michael Newburn explains replacement of general-government LMR system with carrier enhanced PTT service

Aug 18, 2016<u>Donny Jackson</u> / Urgent Communications <u>http://urgentcomm.com/land-mobile-radio/fairfax-county-michael-newburn-explains-replacement-general-</u> government-Imr-system-