Before The
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
Wireless E911 Location Accuracy Requirements	)	PS Docket No. 07-114
	)	
	)	

INITIAL COMMENTS OF TELECOMMUNICATION SYSTEMS, INC. CONCERNING PROPOSED "ROADMAP" FROM APCO/NENA/AT&T/SPRINT/T-MOBILE/VERIZON

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INITIAL COMMENTS OF
TELECOMMUNICATION SYSTEMS, INC.

TeleCommunication Systems, Inc. ("TCS") hereby submits its initial comments in response to the Public Notice ("Notice") released by the Federal Communications Commission ("Commission" or "FCC") dated November 20, 2014[1]. The Notice seeks comments on the filing by APCO, NENA, AT&T, Sprint, T-Mobile, and Verizon of a voluntary consensus agreement that describes a roadmap ("Roadmap") to addressing Indoor Location Accuracy.

TCS submits these comments in the context of its *Ex Parte* Comments ("Comments"), dated October 2, 2014[2], regarding the 3rd Notice of Proposed Rulemaking concerning Location Accuracy ("NPRM")[3]. The Roadmap was presented as an alternative to the approach presented by the NPRM. Such alternatives have been encouraged by the FCC, and previous alternatives have been considered to be helpful in public safety matters. TCS participated in the Text-to-911 alternative proposal and believes that this previous approach accelerated action in providing Text-to-911 services to a broad range of citizen-constituents. TCS has similar hopes for the Roadmap proposal being presented.

From a broad perspective, TCS supports the Roadmap. In fact, many of the elements proposed by the Roadmap are elements described in TCS Comments and have

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[1] *Public Safety and Homeland Security Bureau Seeks Comments in the E911 Location Accuracy Proceeding on the Location Accuracy "Roadmap" Submitted by APCO, NENA, and the Four National Wireless Carriers,*, PS Docket No. 07-114, (Released November 20, 2014) ("Notice")

[2] *See* Letter to Marlene H. Dortch dated October 2, 2014 re: TCS *Ex Parte* Presentation in PS Docket No. 07-114.

[3] Wireless E911 Location Accuracy Requirements, *Third Further Notice of Proposed Rulemaking*, PS Docket No. 07-114, 29 FCC Rcd 2374 (2014).

been addressed in other *ex parte* filings[4]. TCS supports the use of a test bed for the testing of location technologies, strongly believes that there is a need to improve location accuracy for 9-1-1 that addresses indoor 9-1-1 calls, and has been a vocal proponent for techniques that provide dispatchable location as a means to provide an enhanced location of an indoor 9-1-1 caller. This is the essence of what the Roadmap attempts to provide, using existing technologies as the foundation for their approach.

TCS also applauds the fact that this Roadmap leaves the door open for other technology approaches as well, should the proposed dispatchable location approach not succeed in providing the needed enhancements to indoor 9-1-1 location, and explicitly includes assessment milestones.

For these reasons, TCS supports the Roadmap and is committed to working with public safety and interested parties to explain the elements of the Roadmap and to solicit areas of improvement where the Roadmap appears to fall short of any desired goals. TCS will also continue to work with the Roadmap authors to offer any support with regards to further definition and implementation of the Roadmap so as to "meet or beat" the milestones offered.

Section-by-Section Comments on Roadmap Elements

Establish a Test Bed

TCS supports the concept of the creation of a Location Accuracy Test Bed to be used to test various location technologies in a number of different indoor and outdoor 9-

[4] *See* Letter to Marlene H. Dortch dated August 4, 2014 re: TCS *Ex Parte* Presentation PS Docket No. 11-153 and PS Docket No. 10-255.

1-1 call morphologies. TCS described the usefulness of such a test bed in its Comments[5]. In addition to verifying the veracity of location technologies, TCS described the importance of establishing a correlation between horizontal/vertical uncertainty values presented by the location technologies and the actual accuracy of the location technologies being tested. Such a correlation will be important because these uncertainty measurements will be the key element in determining the success or failure of the location technologies as used in actual 9-1-1 calls. The Roadmap did not explicitly mention this correlation, though the reader may infer that this task will be performed because the Roadmap does outline how actual 9-1-1 calls will be used to determine success of the technologies deployed.

Deliver Dispatchable Location

TCS strongly advocates the delivery of the dispatchable location of a 9-1-1 caller. As stated in Comments[6], TCS believes that public safety desires a dispatchable location for every call; in fact, dispatchable location is considered to be the gold standard for locating a 9-1-1 caller. Through various demonstrations and *ex parte* filings[7], TCS has shown that dispatchable location is possible for a 9-1-1 call coming from indoor environments using Wi-Fi® ("Wi-Fi"), one of the indoor technologies recommended by the Roadmap. TCS also believes that Bluetooth® Low Energy ("BLE") beacons similarly can provide a dispatchable location.

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[5] *See* Comments of TeleCommunication Systems regarding Wireless E9-1-1 Location Accuracy Requirements, PS Docket No. 07-114; Section D; pp. 9-12.
[6] *See ibid.*, Section B; p. 2.
[7] *See* TCS *Ex Parte* dated October 2, 2014.

Though there will be some standards work recommended to implement these technologies, TCS demonstrations showed that existing handsets and deployed Wi-Fi technologies can deliver a dispatchable location today. Standards work will ensure that all handsets and Wi-Fi infrastructures will follow a common, repeatable approach; but because the technology already exists, it is likely that a more rapid standardization approach can be followed and that many of the needed improvements can be attained via software, rather than hardware, upgrades in the handsets. This means that the Roadmap approach envisioned actually could be achieved **faster** than the proposed approach in the NPRM, an approach which likely will require hardware and software handset upgrades.

The Roadmap does not rule out the possible need for using other technologies in certain environments, so the test bed must provide the opportunity for other technologies to be demonstrated.

Enhance Horizontal Solutions

TCS supports the use of other and more advanced technologies to provide enhanced horizontal location solutions. TCS believes that the metrics show that the majority of calls are still being placed from environments in which an accurate X/Y location is required. A-GNSS is already being deployed in handsets today with the expectation that horizontal location accuracy will be enhanced because more satellites will be available with which to provide an X/Y calculation. TCS believes that other technologies, beyond A-GNSS and OTDOA, should be allowed to test in the location test beds as well.

Advance Vertical (z-axis) Technology

TCS supports the use of other and more advanced technologies to provide vertical location solutions. Though TCS believes that the metrics show that the majority of calls are still being placed from environments in which an accurate X/Y location is required, the metrics also imply that more calls are coming from indoor multi-story environments.

Dispatchable location is the best approach to addressing these scenarios. It provides a floor number as part of a civic address, and TCS has demonstrated that building floor plan maps could be provided for many of these indoor call scenarios. However, there may be scenarios in which a dispatchable location that contains floor information cannot be provided. In addition, some location technologies provide blanket location coverage to the deployed area, though sometimes only to upgraded handsets. For these reasons, TCS supports the continued testing of other vertical location technologies, including the use of barometric pressure data. Though calibrating a floor number to an elevation raises challenges, providing elevation data to emergency response personnel who are responding to a 9-1-1 call from a multi-story building is better than having no vertical information at all.

Report Metrics

TCS has been advocating the use of data from live wireless 9-1-1 calls in its most recent *ex parte* filings, including its Comments. Therefore, there should be little surprise in seeing TCS' enthusiastic support of the Roadmap's intended use of live wireless 9-1-1 calls to evaluate the effectiveness of various positioning source methods. TCS also notes that the Roadmap understands and anticipates the ability to use live wireless 9-1-1 data to

detect trends. TCS also encourages geo-spatially mapping the live wireless 9-1-1 data to better identify the areas causing problems for the location technology deployed or, in the case of many of the dispatchable location techniques, to identify the areas across which the location technology still must be deployed or interconnected.

Deliver Improved Accuracy for Outdoor and Indoor Calls

TCS supports the Roadmap's effort to deliver improved accuracy for outdoor and indoor wireless 9-1-1 calls using a variety of "heightened location accuracy technologies" that provide a dispatchable location or the 9-1-1 caller's location within 50 meters. TCS has expressed via *ex parte* filings that the wireless 9-1-1 call information provided today is unable to determine whether a wireless 9-1-1 call is coming from an indoor or outdoor location. This inability to anticipate the origination of the call and to therefore apply the appropriate location technology indicates that multiple location approaches may be necessary.

For example, providing a civic address for a call coming from an interstate highway is not likely to be useful. Similarly, providing an X/Y location in a downtown or dense suburban environment with a 50m horizontal uncertainty has the potential to greatly delay the emergency response. A multi-faceted strategy is required. The Roadmap accepts this and addresses this need through the introduction of multiple milestones.

Assess Progress

TCS remains committed to assist the wireless carriers and the public safety community to "meet or beat" the milestones provided in the Roadmap and to work with various location technology providers to implement or augment the plan provided. As an active participant in standards bodies and a recognized global leader of LBS solutions, TCS is qualified and motivated to deploy location technology solutions to provide dispatchable location and heightened location accuracy. TCS believes it is important to assess progress on a regular basis, to use live wireless 9-1-1 call information to determine progress, and to use open and transparent information exchange to assess the value of the technologies in use. TCS believes that these principles are shared by the Roadmap being proposed.

Conclusion

TCS supports the Roadmap. Many of the elements proposed by the Roadmap are elements described in TCS Comments *ex parte* filings. The Roadmap is primarily based on existing and, in many cases, deployed technologies, making it a viable and rapid approach for achieving the goals established by the FCC NPRM, though approaching those goals by including dispatchable location.

TCS also applauds the fact that this Roadmap leaves the door open for other technology approaches as well, should the proposed dispatchable location approach not succeed in providing the needed enhancements to indoor 9-1-1 location, and explicitly includes assessment milestones.

Thus, TCS supports the Roadmap, will work to evangelize the plan while collecting constructive feedback, and commits to work with the Roadmap authors to offer any support with regards to further definition and implementation of the Roadmap so as to "meet or beat" the milestones offered.

Respectfully submitted,

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