



Solicitation # CJ18012

Attachment L

Wireless Data, Voice and Accessories RFP

Network Technology Questionnaire

Network Technology Questionnaire

The following section requests a description of the characteristics of the networks that you will be using to provide the services covered by award Category 1 of this RFP. To understand the infrastructure and context in which your services will be offered, we ask that you please describe your existing networks, technologies, and plans.

1. 4G Cellular Services

Describe the current status and plans for your 4G LTE and earlier generation wireless voice/data technologies.

1. Current 4G network coverage across the U.S.
2. Major planned enhancements for these and earlier generation networks in light of the deployment of 5G-based services
3. Voice Quality Performance Target/Guarantee:
 - a. Mean Opinion Score (MOS) rating for voice calls
 - b. Dropped Call Percentage
 - c. What improvements do you expect with the introduction of VoLTE and Wideband Voice?
4. Broadband Data Performance Expectations/Guarantees:
 - d. Uplink/Downlink Data Rates (Peak, Sustained, Cell Edge)
 - e. Latency
5. Mobile E911 Technology
 - f. Technology employed?
 - g. Location Accuracy?
 - h. Indoor versus outdoor accuracy?
 - i. Compliance with February 2015 FCC Mandates

j. Technology Plans/Expectations/Timeframes

2. Network Reliability, Disaster Recovery and Business Continuity

Describe your overall disaster preparedness plan, the steps you have taken to safeguard your internal and exposed assets, and the types of services and response we can anticipate in the event of an emergency or a disaster.

1. Describe your overall approach to network hardening, including physical security for exposed assets, redundant links to cell sites, and internet-initiated threats.
2. What are your greatest challenges in terms of recovery in the event of extensive damage throughout an extended area, and how do you address them?
3. Describe the types and amounts of back-up batteries, generators, COWs/GOATs and other deployable assets you maintain, and how long a period of disruption you anticipate in your planning.
4. Also describe how your organization would continue to function in the event of a widespread environmental or health threat that would require most citizens to remain at home.

3. 5G Cellular Services

Describe your deployment plans for 5G network coverage across the U.S.

1. Expected Role of 5G in your overall network architecture.
We would like to understand where 5G “fits” in your overall network strategy.
For example, do you see 5G as:
 - a. A wholesale upgrade for 4G LTE services in the wide area,
 - b. A high-capacity local distribution solution for a 4G wide area network,
 - c. Some combination of the two,
 - d. A fixed wireless solution for business or residential Internet access, or
 - e. Something else entirely?
2. Please provide the fundamental strategy you are following for deploying 5G technologies going forward.
3. Timetable and total percent of 5G coverage in each state.
4. Proposed Channel Sizes (in MHz) for macro area and small cell deployments
5. Frequency Band(s) to be used and primary applications for each.
6. Pricing Model: Will 5G usage be metered and priced the same rates as 4G voice and data usage or will premium pricing be applied?

4. VoLTE and Wideband Cellular Voice Services

Describe your plans for Voice over LTE (VoLTE) and Wideband voice services

1. Current level of VoLTE deployment and ongoing plans
2. Wideband Voice (AMR-WB) Availability
3. User device availability.
4. Wideband Voice Interoperability:
 - Between Mobile Carriers

- Mobile Carrier-to-PBX/UC Platform
(i.e. compatibility with wideband voice devices using G.722 or other wideband codecs)
- 5. Circuit Switched Fallback Included?
- 6. Describe your overall pricing model for VoLTE services (e.g. Will wideband voice be offered at the same price as existing voice calling services?).
- 7. As “voice” has essentially becomes additional “data traffic” with VoLTE, indicate the likelihood you will be offering internet-like all-data plans that support all traffic types as opposed to plans that distinguish voice, data and text services.

5. IoT Cellular Network Services

Describe what you currently have and plan to introduce in the way of network services specifically geared toward Internet of Things (IoT) applications.

1. List all IoT-Focused Transport Services (e.g. NB-IoT, LTE Cat M1, etc.) Offered and Planned
2. Performance Expectations (For each service offered):
 - Uplink/Downlink Data Rates (Peak, Sustained, Cell Edge)
 - Maximum Transmission Range
 - Expected Latency
 - Frequency Band(s) Employed
3. General Deployment Plans and Targeted Availability
4. General Pricing Model(s) and Alignment To Minimize Cost with Specific Application Use Cases

6. RCS Cellular Messaging Services

Describe your current and planned deployments of Rich Communications Service (RCS) service.

1. Planned/Deployed?
2. Extent of Coverage
3. List of Features Offered
4. Supported devices
5. Expectations for user adoption going forward

7. Indoor Cellular Services

Describe your primary strategies addressing coverage problems in indoor or other difficult to service locations, and the type of support you can provide to our buyers in addressing these issues.

1. General technology approaches (e.g. DAS, small cells, indoor repeaters, VoWiFi, etc.) for different environments (Small office, large office building, campus, sports arena, etc.)
2. Process by which states request assistance with special coverage issues.
3. Availability of guidance regarding suitability of specific solutions to particular applications, known tradeoffs, regulatory issues (e.g. retransmission rights), and potential interference with existing Wi-Fi or other unlicensed networks in operation.
4. Special support services regarding coverage problems that will be available to NASPO ValuePoint users under this contract

8. Cellular Services on Unlicensed Bands

Describe your overall plans for use of unlicensed frequency bands in providing your service, and how

you intend to handle problems arising from customer private networks that are also using those channels.

1. Frequency bands being considered
2. Planned applications for each band (e.g. Macro network, small cells, VoWiFi, etc.)
3. What level of problems do you anticipate regarding interference problems created through your use of unlicensed channels that might be occupied by WLANs or other private wireless systems?
4. How will users buying under this contract be notified that a system using unlicensed frequencies will be deployed in their facility and what steps will you be taking to ensure against interference with existing networks using those same unlicensed bands (e.g. Wi-Fi, Other 2.4 G/5GHz deployments)

9. Use of Wi-Fi in Cellular Services

Describe how you use Voice/Data/Text over Wi-Fi, the nature of the Wi-Fi services you would use, how the decision is made to use Wi-Fi versus cellular, and the impact Wi-Fi use will have on billable traffic.

1. Do you offload traffic onto Wi-Fi Networks?
2. Indicate the approximate percentage of Wi-Fi usage for your total wireless network traffic over the following types of Wi-Fi networks:

- Wi-Fi Networks built and maintained by you-	Voice ____% Data ____%
- Wi-Fi Networks from certified 3 rd Party providers (e.g. Boingo, Cable Companies, etc.)-	Voice ____% Data ____%
- Customer Wi-Fi Networks-	Voice ____% Data ____%
- Any open and available Wi-Fi network-	Voice ____% Data ____%
3. How is the service choice made to use cellular versus Wi-Fi, and which Wi-Fi network to choose if there are multiple options available?
4. Are any of the following traffic types sent over Wi-Fi charged against the user's service plan?
 - Voice?
 - Data?
 - Text (SMS/MMS)?

10. Public Safety Wireless Priority Service (WPS) - For Bidders Offering Public Safety Services

Describe your ability to provide Wireless Priority Service (WPS) voice services for State employees with critical job duties and responsibility for responding to disaster/emergency events.

1. Describe the general mechanism by which the network will prioritize WPS user calls (e.g. Will public network voice calls in progress be terminated to allow WPS calls to be connected?)
2. Can public safety officials disable calling for the general public to ensure WPS access for first responders?
3. What happens when a base station or other network element becomes overloaded with WPS calls?
4. Define the range of devices supported.

5. Does the service operate on 2G, VoLTE, or both?
6. Do you provide enhanced reporting to public safety agencies regarding WPS availability, dropped calls, performance, etc.
7. Describe the type of back-up and recovery measures that are included as part of WPS.
8. Do you have the ability to augment coverage/capacity with deployable assets during events/disasters?
9. Detail levels of user priority defined and procedures required in applying for and initiating WPS for a user.
10. Confirm your ability to activate equipment and WPS within 24 hours after request in the event of a State of Disaster/Emergency.

11. National Broadband Public Safety Networks (NPSBNs) - For Bidders Offering Public Safety Services

Describe your plans for deploying FirstNet or FirstNet-like (i.e. National Broadband Public Safety Network) solutions for providing priority data and video service to State employees with critical job duties and responsibility for responding to disaster/emergency events.

Service Overview

1. Will the priority NPSBN service operate over a fully separate radio access (RAN) and evolved packet core (EPC) network, and if not, what elements will be shared with the public wireless network. Are those plans expected to change in the foreseeable future?
2. In shared network elements, describe the specific mechanisms by which public safety traffic will be prioritized over other public network traffic in both wireless and wired portions of the network.
3. Describe the range of capabilities available to support Quality of Service (QoS) for different classes of public safety traffic (e.g. voice, video, PTT/MCPTT, priority data, best effort data, background data, etc.), and what modifications would be required on end user devices or servers to mark traffic so that it would be assigned to the correct QoS priority level.
4. What radio frequency band(s) will your public safety service be operating on? Are there plans to change or expand that list?
5. At any point do you plan to offer a physically separate public safety RAN (please provide your definition of “physically separate”) using Band 14, and will public safety officials have the ability to preempt access to those radio network resources from the general public in the event of an emergency or disaster?
6. Describe the availability of compatible end devices for your public safety services, and identify any potential changes to your network offering (e.g. migration to Band 14) that would require device upgrades, and the scale of those upgrades (e.g. New SIM, Other hardware update, device replacement, etc.).
7. Does this page from the FirstNet Web Site <<https://www.firstnet.com/devices>> represent the complete list of FirstNet Certified Compatible devices?
8. Describe what happens when all public network traffic has been preempted and the network becomes overloaded with public safety traffic.

Service Offerings and Performance Guarantees/Expectations

9. Voice Telephony: What are your plans, timetables and proposed technologies to offer wireless voice telephony services on your public safety network, and will it be carried with appropriate QoS?
10. Video: What are your plans, timetables and proposed technologies to offer wireless video services on your public safety network, and will it be carried with appropriate QoS? As video calls may be originated from a laptop, how will the user signal to the network that this is a video call so that appropriate QoS handling can be applied?
11. Broadband Data Performance Expectation/Guarantee:
 - How many levels of priority data services (e.g. Critical, High Priority, Best Effort, Background Data, etc.) will be offered, and how will user devices signal to the network the QoS level that should be applied to each session?
 - Uplink/Downlink Data Rates (Peak, Sustained, Cell Edge) and Latency for each QoS level supported.
 - Impact on network performance in Network Overload Conditions
12. Text: Describe the text capability that will be offered with your NPSBN, specify if it is separate from the public SMS/MMS service, the typical and maximum message delivery delay, and any particular features it provides for public safety users.
13. PTT: Describe the capabilities of your current push-to-talk (PTT) service including interface to existing LMR systems.
14. MCPTT: Describe your plan and timetable for introducing Mission Critical PTT (MCPTT) services:
 - Overall plans and timetables
 - Additional features to be provided with MCPTT
 - Availability of direct peer-to-peer wireless device connectivity.
 - Ability of MCPTT devices to continue to operate on a direct peer-to-peer basis if the cellular base station is disabled.
 - Please describe what functions or capabilities would be lost in the event that the service cell site becomes inoperable.

Service Level Agreements

15. Is there a specific, defined SLA for public safety customers? If so, please describe in detail.

Interoperability

16. Describe the level of interoperability between your solution and other cellular-based NPSBNs, FirstNet or other, for:
 - a) Voice Telephony (When Offered): Will public safety priority and QoS traffic classes be maintained for calls passing between different carriers' networks?
 - b) Video Service: Will public safety priority and QoS traffic classes be maintained for video connections passing between different carriers' networks?
 - c) Broadband Data: Describe how public safety priority and QoS traffic classes will be maintained for traffic passing between different carriers' networks?
 - d) Text: Will NPSBN text services interoperate with users on other NPSBNs, and what other text services (e.g. SMS/MMS/RCS, Apple Messages, WhatsApp, etc.) can it exchange messages with.

- e) PTT: Describe interoperability between PTT users served on different carriers' networks, including stations that are in the same broadcast group.
- f) MCPTT: Describe interoperability between MCPTT users served on different carriers' services, including stations that are:
 - o Communicating through their cellular base station
 - o Communicating directly with one another (through Proximity Services)
 - o In the same broadcast group.

Network Management and Control

- 17. Does the vendor support a separate 'Portal' for public safety users?
- 18. Does the vendor provide the ability for public safety customers to monitor network performance in real-time and a mechanism to communicate directly with network operations personnel during times of crisis?
- 19. Will government agencies have the ability to totally preempt public network voice/data/text traffic on shared elements in extreme circumstances to ensure public safety users maintain network availability at all times?

Security, Reliability and Hardening Measures

- 20. Describe the security measures and standards employed for both traffic and control messages on both wired and wireless portions of the network.
- 21. Describe the overall network hardening for public safety services, and approach to meeting NPSTC public safety grade standards. Including but not limited to: battery backup, backup generator, redundant backhaul, etc.
- 22. Does the vendor have the ability to augment coverage/capacity with deployable assets during events/disasters?
- 23. How would public safety or other government agency requests for those deployable assets be prioritized over public network services in an emergency or disaster situation?
- 24. Does the vendor support local agencies purchasing their own cellular equipment to 'turn up' additional capacity when/where needed.

User Classification, Authorization and Onboarding

- 25. Detail classes of user priority defined and procedures required in applying for and initiating public safety priority service for a user as well as the mechanism for device provisioning and management in both day-to-day operations and during critical incidents.
- 26. Describe the process for a user to use his/her personal mobile device to access the public safety network services if required.
- 27. Confirm your ability to activate equipment and priority data/video services within 24 hours after request in the event of a State of Disaster/Emergency.