



SCTA Technical Standards

SCTA Mission: Improve the health of all South Carolinians through telehealth.

Telehealth is the use of telecommunication and information technologies in order to provide clinical health care at a distance. The South Carolina Department of Health and Human Services Program Requirements, Coverage Guidelines, item 4 states 'The telemedicine equipment and transmission speed and image resolution must be technically sufficient to support the service.'

SCTA Expected Deliverables: Create, deploy and support an open-access Telehealth network in South Carolina. Disseminate, support and utilize open-access telehealth technologies in SC hospitals and primary care clinics.

SCTA Strategy: The establishment of an open-access telehealth network in South Carolina is achieved through the use of industry standard video protocols H.323, SIP, H.264, and WebRTC. Using standardized protocols, cloud-based programs, and equipment ensures compatibility across all statewide telehealth network infrastructure components and participating sites.

SCTA Open-Access Network Technical Standards:

All participating Telehealth endpoints and infrastructure should utilize standardized videoconferencing protocols or cloud-based software. Telehealth endpoints may include both hardware and or software codecs. Requiring the use of industry standards ensures compatibility with existing SCTA Telehealth infrastructure investments and guarantees consistent communications and call capability between all participating SC healthcare sites.

Video Conferencing Endpoints Defined:

Hardware Codecs: A device that encodes a data stream or signal for transmission, ~~storage~~, or encryption and decodes it for playback. The term codec is also used as a generic name for a videoconferencing unit.

Software Codecs: A software application designed to perform the same functions as hardware codecs while utilizing processor and video resources on a PC, Mac, tablet or other portable / mobile device.

Cloud based Software: An application software that is hosted in the cloud, and that users access via a web browser, a dedicated desktop client, or an API that integrates with a desktop or mobile operating system.



Telehealth Infrastructure Defined:

Telehealth infrastructure: The servers and or application specific appliances that facilitate both multipoint conferencing and interoperability with other standards-based video endpoints including SIP, H.323 and H.264. Interoperability includes the transcoding of media as well as the interworking of signaling to facilitate point-to-point and multipoint calling. Categories of video conferencing infrastructure include, but are not limited to: video routers, gateways, registration points, multipoint conference units (MCU), call managers, telepresence servers, network management and provisioning servers.

SCTA Network Protocol Standards: South Carolina Telehealth Alliance partners will utilize equipment that is compatible with International Telecommunications Union (ITU) defined standards for video conferencing. These standard based protocols are defined as H.323, Session Initiation Protocol (SIP), H.264, and its extensions.

Cloud based Infrastructure: A cloud computing service model by which computing resources are supplied by a cloud services provider. The cloud-based vendor provides storage, network, servers, virtualization, and security. This service enables users to free themselves from maintaining an on-premises data center.

Protocols definition:

H.323 is a protocol standard for multimedia communications. H.323 was designed to support real-time transfer of audio and video data IP networks. The standard involves several different protocols covering specific aspects of Internet telephony. The International Telecommunication Union (ITU-T) maintains H.323 and these related standards. Hardware based codecs almost exclusively use the H.323 protocol.

Session Initiation Protocol (SIP) is a signaling communication protocol widely used for controlling multimedia communication settings such as voice and video calls over (IP) networks. Software based codecs use the SIP protocol.

H.264 The intent of the H.264/AVC project was to create a standard capable of providing good video quality at substantially lower bit rates than previous standards. Products that utilize the H.264 standard should be utilized in areas where low bandwidth prevents telehealth sessions from being successful using high-definition h.323 or SIP protocols.

WebRTC (Web Real-Time Communications) An open-source project that enables real-time voice, text, and video communications capabilities between web browsers and devices. WebRTC provides software developers with application programming interfaces (APIs) written in JavaScript. Developers use these APIs to create peer to peer (P2P) communications between internet web browsers and mobile applications without worrying about compatibility and software for audio, video, or text-based content.

Video Resolution and Frame Rates: Whenever possible, Telehealth endpoints and telehealth infrastructure should be configured to support high-definition conferencing. If bandwidth

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problems prevent the use of high-definition resolutions or frame rates, the equipment should be configured to use the available bandwidth. The SCTA default minimum settings for high-definition resolution and frame rates are recommended at 720p at 30 frames per second.



Network and Endpoint Security:

SCTA partners must address network and endpoint security with the use of advanced encryption standards. Telehealth sessions should be configured to use a minimum of AES 128 bit encryption session security standards. Each software codec must have assigned usernames and passwords that prevent unauthorized use of the systems. In addition to encryption and user account security, any device that participates in SCTA consults must register to secure video conferencing gatekeepers. Gatekeepers capture and provide audit information for each telemedicine encounter. Audit trails and call records must be accessible to insure SCTA partners meet all Family Education Rights and Privacy Act (FERPA) , Healthcare Insurance Portability and Accounting Act (HIPAA) , Payment Card Industry (PCI), Protected Healthcare Information (PHI) and other state and federal government regulatory requirements.

Telehealth Providers and Referring Site Minimum Technical Standards:

South Carolina hospitals and remote sites participating in SCTA Telehealth programs shall be responsible for ensuring that all telehealth endpoints have access to wired and/or wireless Ethernet connectivity and unfiltered, publicly routable Internet or PSPN access. In addition to Internet or PSPN network access, the following requirements must be satisfied for successful connectivity and continuity in telehealth programs and services.

- a. IP Addressing – Telehealth equipment and communications requires the use of Internet Protocol (IP) addressing. It is the responsibility of the hospital or remote site to provide publicly routable or network address translated IP addresses for use with Telehealth equipment and communications.
- b. In addition to IP addressing, subnet mask and gateway information, DNS services must be provided for successful consultations.
- c. Wired connectivity - 100mb full duplex switch port or better is required.
- d. Wireless connectivity – wireless can be utilized if the minimum signal strength in all areas supporting wireless telehealth equipment is -65DB or better on non-interfering 802.11n or 802.11ac access points.
- e. Internet or PSPN bandwidth – Participating sites should provide bandwidth at a rate of at least 2 megabits per second, per simultaneous telehealth call and between all call participants.
- f. Access to enterprise, non-enterprise, and/or PSPN Telehealth infrastructure - Telehealth encounters between sites will utilize infrastructure and services provided by the participating enterprise and or the Palmetto State Providers Network (PSPN). The infrastructure

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includes Gatekeepers, Gateways, Multi point conference units (bridges), Call Managers, Recording devices, Portals, and Telepresence Management Servers.

- g. Firewall rules exceptions - Telehealth consults require real-time two-way communications for audio, video, and content sharing. Medical device peripherals used in telehealth encounters provide remote access to examination camera images and stethoscope audio. Firewall rules exceptions are provided to enable these patient care devices and allow for bidirectional communications. The following ports and protocols are currently used in creating firewall exceptions.

Firewall exceptions and port rules:

H.323 and Assent ports needed through Firewall

Function	Port/Range	Type	Direction
Gatekeeper Discovery (RAS)	1719	UDP	↔
Q.931 Call Setup	1720	TCP	↔
H.245 Range	5555 - 6555	TCP	↔
Video, Audio & Data/FECC Range	2326 - 2487	UDP	↔

H323 Traversal Assent Ports

Function	Port/Range	Type	Direction
Gatekeeper Discovery (RAS)	1719	UDP	↔
Call Setup/Caps Exchange	2776	TCP	↔
RTP Media	2776	UDP	↔
RTCP Media	2777	UDP	↔

Firewall Ports for H.323 and SIP Video Communications

Some manufacturers may use alternate ports for video communications. Check with your equipment and manufacturers recommendations for specific port and protocol information.

To register with SCTA gatekeepers and place/receive calls, the client side firewall TCP/UDP connections must be opened.

This document discusses the firewall ports that need to be opened for codecs & carts to communicate with SIP clients.

Session Initiation Protocol (SIP). Subscribing, registering, presence querying, call invites is all communicated through SIP. SIP messages are sent using TCP, with or without TLS encryption depending on the provisioned settings.

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The default SIP listening ports used are 5060 (unencrypted) and 5061 (encrypted).

All ports below should be bi-directional.

Type	Protocol	Range Start	Destination Port/Range End
DNS	UDP	N/A	53
TURN	UDP	N/A	3478 or 5349/TLS
SIP Signaling	TCP	N/A	5060 or 80
SIP Secure Signaling	TCP	N/A	5061 or 443
RTP – Video	UDP	16384	32767
Provisioning Software Upgrade	TCP	N/A	80/443
Gatekeeper Discovery (RAS)	UDP	N/A	1719
Q.931 Call Setup	TCP	N/A	1720
H.245	TCP	5555	6555
Video, Audio, & Data / FECC	UDP	2326	2487
Call Setup/Caps Exchange	TCP	N/A	2776
RTP Media	UDP	N/A	2776
RTCP Media	UDP	N/A	2777

If registering with PSPN infrastructure, the ports should be opened to the following PSPN hosts:

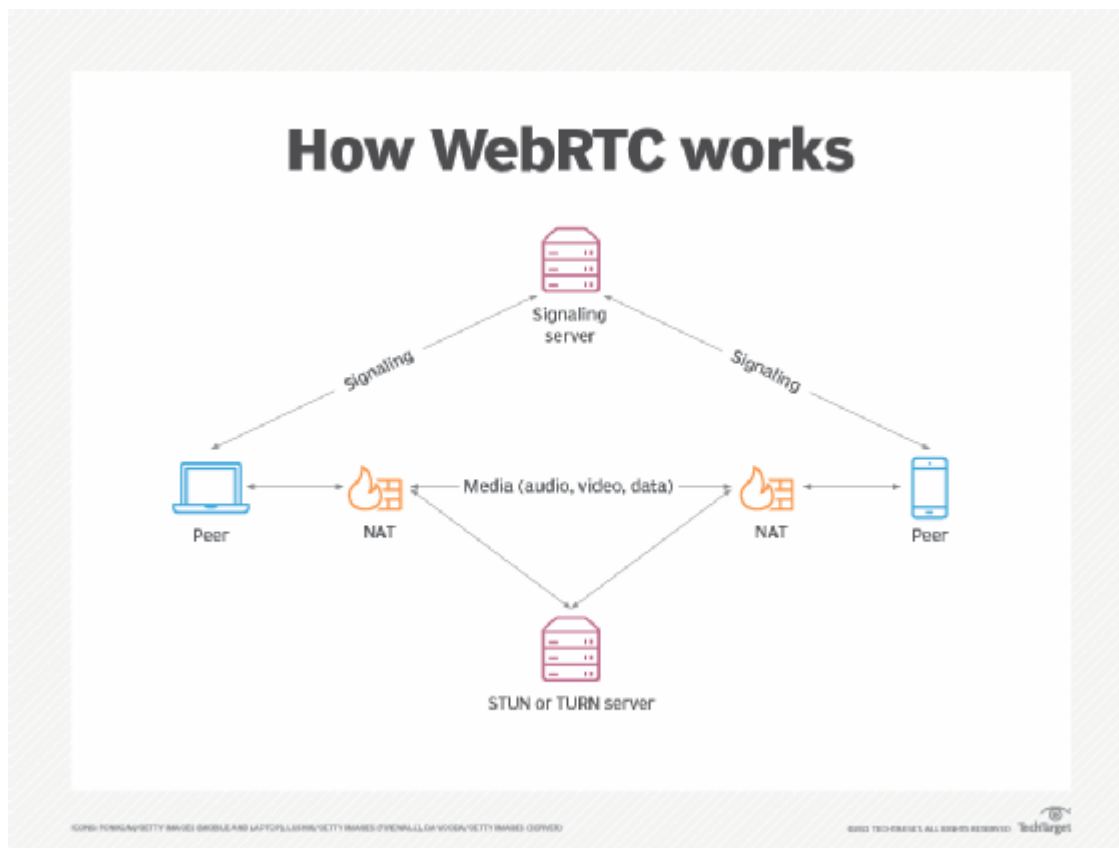
Vcscluster.pspnsc.org
 206.74.79.3 Border controller (VCS)
 206.74.79.7 Border Controller (VCS)
 206.74.79.12 TMS management server

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Firewall Ports for WebRTC

The following table provides the ports and destination relating to WebRTC firewall rules.

1. TCP Port 443 (HTTPS): outbound
2. UDP and TCP port 3478 bidirectional to the WebRTC server
3. UDP Ports 50,000 – 65,535 (RTP/sRTP/RTCP) bidirectional to the WebRTC peers
These ports are optional; if blocked, media will be proxied using TURN on port 3478.



Appendix A:

Exceptions to the use of SCTA technical standards:

The SCTA technical standards are required to ensure telehealth network and communications continuity, equipment compatibility, network security, and call quality. The SCTA recognizes that not every telehealth program or service will operate equipment that conforms to the open-access network technical standards and network protocol standards. Several SCTA telehealth programs and services operate equipment that is part of a larger network of services which do not utilize the communications protocols addressed in the SCTA technical requirements. The

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SCTA also recognizes that changes in technology will eventually impact all telehealth programs, requiring the need for exceptions to the SCTA technical requirements.

When the need for exceptions exists, it should be noted that the exceptions are too specific sections pertaining to the open-access network and standard network protocols. If proprietary platforms are implemented, there are a number of technical standards in this document that should still be met, particularly with regard to image resolution and security.

The current known exceptions to the SCTA technical requirements are:

- 1) The MUSC and Roper St. Francis Telestroke program and its equipment (i.e. SoloTelaDoc)
- 2) The Palmetto Health and Greenville Health System Telestroke program and its equipment (i.e. Solo TelaDoc)