

# NetLink Wireless Telephone System

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## **What is the NetLink Wireless Telephone System?**

The NetLink Wireless Telephone System™ (NetLink WTS) is an IEEE 802.11 standards-based wireless LAN (WLAN) telephone system, which provides high quality mobile voice communications throughout the workplace using voice-over-IP (VoIP) technology. The NetLink WTS has two components, Wireless Telephones and Telephony Gateways.

## **How does the NetLink WTS compare to the Link Wireless Telephone System?**

From the end user's perspective, the NetLink WTS provides the same functionality and quality as the Link Wireless Telephone System™ (Link WTS). The choice between the two SpectraLink systems is based on the customer's infrastructure and management preferences. The NetLink WTS allows telecommunications and IT managers to simplify their wireless infrastructure by combining voice and data traffic over the same network. Customers are able to leverage their investment in 802.11 wireless LANs and preserve their investment in digital PBX technology. Because 802.11 is an international standard for WLANs, NetLink can be the choice for wireless telephony throughout the global enterprise. The Link WTS remains the economical choice for customers who need to implement a wireless voice-only solution.

## **How does the NetLink WTS work?**

NetLink Wireless Telephones operate as clients on the WLAN, along with other mobile 802.11 devices. Fixed radios on the Wireless LAN, called access points (APs), receive IP voice packets from Wireless Telephones and forward them to the NetLink Telephony Gateway over the Ethernet LAN. The Telephony Gateway connects to the host telephone switch using digital or analog line interfaces. Using SpectraLink's exclusive LinkPlus™ digital interface technology, Wireless Telephones are able to emulate proprietary digital telephone sets, making advanced switch features such as multiple line appearances and display features available to mobile users.

## **What experience does SpectraLink have with this technology?**

SpectraLink is the market leader in workplace wireless telephone systems, having sold more multi-cell systems than any other manufacturer. We have been producing, improving, and expanding our flagship product, the Link WTS, for more than eight years. Because of the experience gained in the development of the Link WTS, SpectraLink understands mobile workers' functional requirements better than any other manufacturer. Applying this experience, we have added the NetLink WTS, to our product line. SpectraLink combines this extensive experience with the WLAN knowledge of our technology alliance partners and reseller partners to deliver a complete voice and data solution.

## **What is the IEEE 802.11 standard?**

The 802.11 specification is an international standard for wireless LANs approved by the IEEE in 1997. The 802.11 standard, also known as wireless Ethernet, defines the physical (PHY) and media access (MAC) requirements for all devices on the WLAN. The 2.4GHz PHY is defined as operating in the 2.400-2.483 GHz band using either frequency hopping or direct sequence spread spectrum radio technology. The MAC defines how packets access the wireless media. This method is known as Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA). Where the 802.3 wired Ethernet standard uses Collision Detection, 802.11 uses avoidance because collisions are difficult to sense in an RF network. The NetLink WTS is fully compatible with the standard and can operate over any 2.4 GHz 802.11 WLAN infrastructure.

## **Does the NetLink WTS use Voice over IP (VoIP)?**

Yes, standard Internet Protocol (IP) packets are used to transport voice on the wireless and wired LAN. Within the IP packets, SpectraLink's proprietary protocol is used to minimize the traffic overhead, deliver excellent voice quality, and maximize the functionality of Wireless Telephones by providing digital PBX station features to on-premises mobile users. The NetLink Telephony Gateway cannot be used for wide area networking or as a PBX replacement.

**What is the transmission speed of the handset radio? Does it work with new 11 Mbps APs?**

The transmit/receive data rates of the Wireless Telephone radio are 1 and 2 Mbps. These speeds are the common denominator for all 802.11 APs, which can operate at either 1 or 2 Mbps, as defined in the standard. These rates are more than adequate for voice applications where small packets are transmitted frequently; moreover, the lower data rates maximize range and prolong Wireless Telephone battery life. The NetLink Wireless Telephone radio works with the 802.11b standard for high speed (11 Mbps) DS.

**What is the throughput of a voice conversation? What is the packet size?**

One voice conversation consumes approximately 150 kbps of total bandwidth roundtrip. The total packet size including all overhead is 128 bytes. Seventy-two bytes are payload, containing the SpectraLink protocol. The remainder of the packet (approximately 60%) is IP, MAC and LLC overhead. Fifty packets per second are transmitted by the Wireless Telephone in each direction for a total of 100 packets per second.

**What is the range of the NetLink Wireless Telephone?**

The range of the radio in the wireless handset varies according to a number of factors, including internal wall construction, obstructions, AP output power, and RF transmission type (FH or DS). Also, range varies by AP vendor. Considering all of these variables, the range in a given customer environment varies significantly. However, in laboratory tests the typical indoor range between the Wireless Telephone and AP is approximately 150 to 200 feet.

**What is the maximum number of system users today? Will a larger system be available?**

Each NetLink Telephony Gateway can support 16 users and eight simultaneous calls. Up to four gateways can be used on a network, maximizing the system at 64 users and 32 simultaneous calls. SpectraLink will be expanding the user capacity of the system in mid-2000. The larger Telephony Gateway will be a rack-mounted cabinet with 16-port expansion cards, a central administration interface and enhanced management capability.

**How is voice quality ensured?**

The NetLink WTS employs several technologies to ensure high voice quality. The audio compression used is 24 kbps Adaptive Differential Pulse Code Modulation (ADPCM). This compression rate is the best available trade-off between bandwidth and audio quality, providing a robust, low latency, high-quality voice stream. In order to enhance voice quality over the wireless network, SpectraLink has developed a quality of service (QoS) mechanism that is implemented in the Wireless Telephone and AP. This mechanism, SpectraLink Voice Priority (SVP), gives preference to voice packets over data packets on the wireless medium, increasing the probability that all voice packets are transmitted efficiently.

**Can voice and data packets be transmitted across the wireless network at the same time?**

Yes. Because all of the devices are compatible with the 802.11 standard, they are able to communicate in the same wireless network. However, when data and voice are competing for bandwidth it is necessary to have a prioritization method, such as SVP, that provides a controlled preference to voice.

**If voice has priority, what happens to data traffic? Can data throughput be guaranteed?**

An option in the NetLink software allows the system administrator to set the maximum number of simultaneous voice calls over a single AP. Active calls will not handoff to APs that are carrying the maximum number of calls but will handoff to other nearby APs. This effectively reserves a portion of the bandwidth for data traffic.

**How does SVP fit within the IEEE 802.11 standard?**

SpectraLink Voice Priority is an open specification that is compliant with the IEEE 802.11 standard. Currently the IEEE 802.11 standard provides no mechanism for QoS. SpectraLink is working with the IEEE 802.11 committee to add MAC enhancements to support QoS and other improvements.

**Which WLAN vendors are implementing SVP?**

SpectraLink has established a technology alliance with leading WLAN vendors, including BreezeCOM, Cisco, Intermec, Teklogix and Telxon. The technology alliance consists of a cooperative engineering effort, ensuring product interoperability and high performance, along with implementation of SpectraLink Voice Priority (SVP) into the access point.

**Does SpectraLink recommend a WLAN vendor? Does SpectraLink recommend FH or DS?**

SpectraLink will provide a list of our technology partners to customers. We encourage customers to talk to each of these companies and research which WLAN product best suits their needs. SpectraLink provides both frequency hopping and direct sequence Wireless Telephones. Again, customers should consult with their WLAN vendor of choice to determine which radio type best fits their design requirements.

**What wireless infrastructure is required at the customer site to support the NetLink WTS?**

The NetLink WTS requires an 802.11 WLAN to be installed and operational on the customer premises. The number of APs is independent of the NetLink WTS, however the coverage area and available bandwidth must be adequate to support all users. Also, all APs and Wireless Telephones must reside on the same LAN subnet. Providing high voice quality requires the implementation of SVP by the WLAN manufacturer.

**How many voice calls can an AP support? What is the effect on data throughput?**

Depending on the manufacturer three to seven simultaneous calls can be supported on an AP, requiring approximately 450-1050 kbps of available bandwidth.

**Will adding telephones to my WLAN require more APs?**

Like any client device, adding Wireless Telephones to a WLAN increases the bandwidth requirement because of the increase in traffic. A lightly loaded WLAN may not require additional APs. However, on a moderately to heavily loaded WLAN or where closer range/more coverage area is needed, additional APs may need to be installed.

**Who is responsible for designing the layout of APs?**

Each WLAN vendor provides tools and services for designing the layout of APs on the customer premises. SpectraLink provides our WLAN partners with specific information about the performance of the NetLink WTS to incorporate into their design rules.

**What LAN infrastructure is required? Does SVP prioritize voice packets on the LAN?**

Like the wireless network, the LAN must have the bandwidth to support additional traffic generated by Wireless Telephones. A switched Ethernet network is required to support mobile clients and provide high voice quality. SVP only provides QoS to voice packets in the wireless network. Therefore, SpectraLink recommends isolating LAN traffic generated by wireless devices from wired devices and utilizing LAN-based QoS tactics (such as RSVP and 802.1p) whenever available.

**Can the NetLink WTS be used with wireless bridges or across a WAN?**

The NetLink WTS is designed for on-premises use only. The system requires very tight timing considerations and minimal latency to ensure good audio quality. It is not tested or recommended for use with wireless building-to-building bridges. Likewise, NetLink system components should not be distributed across a wide area network (WAN). Transport of voice traffic after the PBX demarcation is independent of the NetLink WTS.

**Is the NetLink Telephony Gateway required? Can other IP gateways be used?**

The Telephony Gateway is a required component. It manages all Wireless Telephones on the network and converts from voice packets on the LAN to voice circuits on the PBX. All calls are then connected by the PBX or key system regardless of the whether the destination is another Wireless Telephone, a wired extension or an outside call. Therefore, "peer-to-peer" calling is not supported and the gateway is required for all implementations. IP gateways or LAN-based PBXs cannot be used in place of the Telephony Gateway.

**What is H.323? Does the NetLink WTS support H.323?**

H.323 is an International Telecommunications Union (ITU) standard developed for video/audio conferencing that has been adopted by several VoIP vendors for call setup and signaling. The Telephony Gateway uses H.323 to provide third-party wireless clients analog-equivalent access to the PBX. SpectraLink Wireless Telephones use proven telephony protocols for call handling, rather than H.323, allowing the handset to emulate the features of a digital PBX telephone set. SpectraLink supports the development of the next generation H.323 standard, which intends to provide improved telephone functionality for IP devices.

### **What products compete with the NetLink WTS?**

Symbol Technologies is the only other vendor that has released a voice-over-WLAN product, named the NetVision Phone System.

### **How does the NetLink WTS compare to Symbol's NetVision phone?**

Symbol Technologies takes a significantly different approach than SpectraLink to providing a WLAN mobile telephone solution. First, Symbol uses third-party IP gateways to replace traditional PBX functionality, providing analog functionality only. Therefore, the NetVision phone simply provides the equivalent of a single line, 2500-set with no PBX display information. Second, a third-party vendor that manufactures consumer cellular telephones supplies the NetVision handset. It is not designed for workplace use. The structural integrity of the telephone is suspect, as indicted by Symbol's 3.3-foot drop specification. Third, the Symbol approach limits customer choice of WLAN and PBX technology. NetVision phones are sold along with Symbol data devices for use on Spectrum24 WLANs. Symbol has no alliances with other vendors to ensure interoperability. Also, NetVision does not digitally interface with the installed base of PBXs. Lastly, Symbol's focus is on data networking and management systems. Symbol has no experience with telephone technology or the user requirements associated with telephony applications.

### **What type of battery does the Wireless Telephone use?**

NetLink handsets use the latest Nickel Metal Hydride (NiMH) battery technology, which provides more than two hours of talk time and up to 80 hours of standby.

### **Does the Wireless Telephone support text messaging?**

Yes, the NetLink WTS supports SpectraLink's Open Application Interface (OAI). The OAI enables third-party computer applications to write to the handset, giving users the ability to view and respond to alphanumeric messages displayed on the Wireless Telephone. Messaging application examples include nurse call paging, security alarm notification, and inventory status.

### **How will the NetLink WTS fit into the future of IP telephony?**

As the use of IP telephony increases, SpectraLink will develop end-to-end IP voice connections within the workplace. As the leader in workplace wireless telephone systems, SpectraLink is dedicated to providing mobile users with advanced features from the most popular telephone switch platforms.

### **What is the cost of the NetLink WTS?**

The list price for a 16-port NetLink Telephony Gateway is \$3995. The NetLink Wireless Telephone list price is \$749 (\$799 with the addition of vibrator ring).

### **Can I upgrade a Link WTS to NetLink WTS?**

The Link WTS provides that same features and functionality to the Wireless Telephone user, therefore there is usually no reason to upgrade the system. SpectraLink will continue to improve the Link WTS, as it is our flagship product and the best-selling wireless telephone system on the market. If customers add a wireless LAN to their network, both the Link WTS and NetLink WTS can co-exist on the customer premises.

### **Is the NetLink WTS available internationally?**

Yes. SpectraLink has obtained the necessary product certifications required by the European Union and has established distribution channels throughout Europe.

### **How does a customer buy the NetLink WTS?**

The NetLink WTS is available through leading WLAN distributors and resellers. Check the SpectraLink web site ([www.spectralink.com](http://www.spectralink.com)) for reseller contact information.

**For more information visit [www.spectralink.com](http://www.spectralink.com) or call 1.800.676.5465**

