

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

WIRELESS TRANSPORT LLC,

Plaintiff,

v.

NETGEAR, INC.,

Defendant.

C.A. NO.

JURY TRIAL DEMANDED

ORIGINAL COMPLAINT FOR PATENT INFRINGEMENT

1. This is an action for patent infringement in which Wireless Transport LLC makes the following allegations against Netgear, Inc.

PARTIES

2. Plaintiff Wireless Transport LLC (“Plaintiff” or “Wireless Transport”) is a Delaware limited liability company with its principal place of business at 16192 Coastal Highway, Lewes, DE 19959.

3. On information and belief, Netgear, Inc (“Defendant” or “Netgear”) is a corporation organized and existing under the laws of the State of Delaware, which can be served through its registered agent Incorporating Services, Ltd., 3500 S. DuPont Hwy., Dover, DE 19901.

JURISDICTION AND VENUE

4. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

5. Venue is proper in this district under 28 U.S.C. §§ 1391(c) and 1400(b). On information and belief, Defendant is incorporated in the State of Delaware, and, thus, resides in the State of Delaware for the purposes of 28 U.S.C. § 1400(b).

6. On information and belief, Defendant is subject to this Court's specific and general personal jurisdiction pursuant to due process and/or the Delaware Long Arm Statute, due at least to its substantial business in this forum, including: (i) at least a portion of the infringements alleged herein; and (ii) regularly doing or soliciting business, engaging in other persistent courses of conduct, and/or deriving substantial revenue from goods and services provided to individuals in Delaware and in this Judicial District.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 6,563,813

7. Plaintiff is the owner of United States Patent No. 6,563,813 ("the '813 patent") entitled "Wireless Transport Protocol." The '813 Patent issued on May 13, 2003. A true and correct copy of the '813 Patent is attached as Exhibit A.

8. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides products and/or services that infringe the '813 patent. The '813 patent provides, among other things, "A communication system comprising: a wireless client; a wireless network; a land-line client; a land-line network; and a network backbone interfacing said land-line network and said wireless network to allow data packets to be exchanged between said wireless client and said land-line client, said communication system using a wireless transport layer protocol for data frame transmission over said land-line and wireless networks, each data frame including connection handling information specifying at least one data transport connection to be used to transmit data between said wireless client and said land-line client over said wireless and land-line networks; connection addressing information; a user data field including a data packet to be transmitted from one client to another client; and at least one sequencing field identifying the last packet received by the client that is transmitting a current data packet."

9. Defendant directly and/or through intermediaries, made, has made, used, imported, provided, supplied, distributed, sold, and/or offered for sale products and/or services that infringed one or more claims of the '813 patent, including at least Claim 6, in this district and elsewhere in the United States. For example, but without limitation, the ProSAFE Wireless Management Solution forms a communication system within the meaning of the '813 Patent. By making, using, importing, offering for sale, and/or selling such products and services, and all like

products and services, Defendant has injured Plaintiff and is thus liable for infringement of the '813 patent pursuant to 35 U.S.C. § 271.

10. NETGEAR makes, uses, sells and/or offers for sale a communication system. For example, NETGEAR provides NETGEAR ProSAFE Wireless Management Solution ("a communication system") which comprises network products including NETGEAR ProSAFE Wireless Access Points (APs) and NETGEAR ProSAFE Wireless Controllers.

High Performance Wireless Solutions

NETGEAR ProSAFE® Wireless Access Points (APs) deliver the robust security, unparalleled reliability and high performance that your organization needs. From single and dual band, multiple SSIDs, to Power over Ethernet support, and a complete enterprise feature set, we have APs that will seamlessly work within your complex IT environment.

NETGEAR ProSAFE® Wireless Management Solutions solve the quandary of individually configuring, deploying, and managing multiple standalone wireless access points. With support of up to 150 APs, it provides a central point to configure and manage your wireless network. Firmware updates and configuration changes can be pushed across multiple APs simultaneously – at the push of a button.

[ProSAFE Business Wireless Access Points](#)

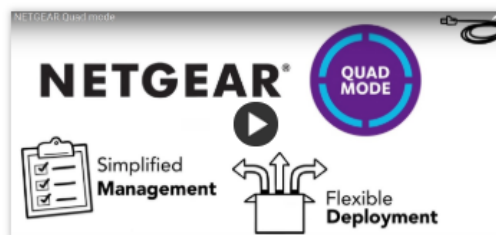
[ProSAFE Wireless Management](#)



Source: <https://www.netgear.com/business/solutions/organization-size/mid-sized-business/>

Wireless Management

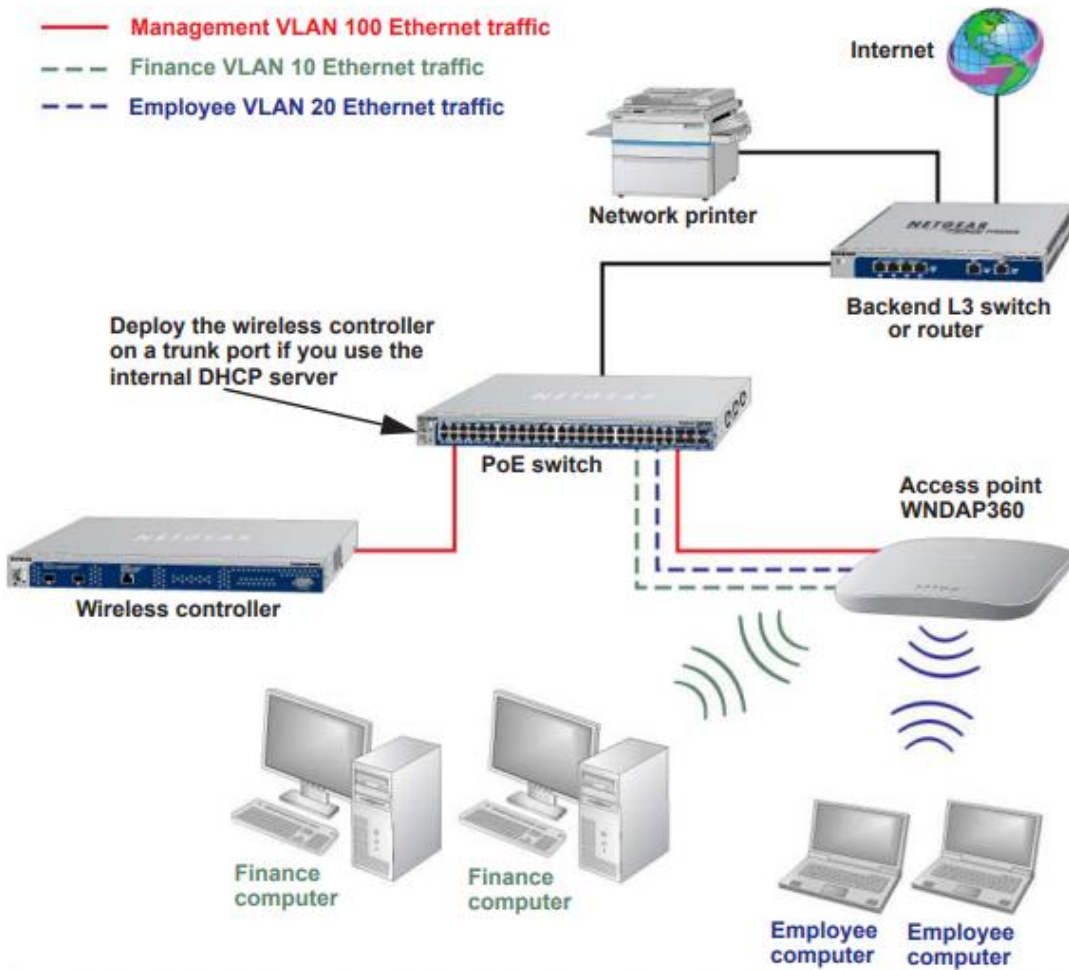
Wireless networking continues to be a growth area, fuelled by device proliferation and a desire to be connected anytime, anywhere using any device. Independent analyst's point to more Controller based solutions being sold over standalone AP deployments, as IT departments deal with an increase in wireless management challenges that are best served with a centralized management platform. Choose to manage your WLAN either through the Cloud with Business Central Wireless Manager, or with a hardware based on site controller.



Quad Mode Management

- Enable wireless users to seamlessly roam while continuously connected to the network with Controllers
- Seamlessly grow your environment with NETGEAR "QUAD-mode" (WAC720/730, WC7500, WC7600, WC9500, Business Central)
- Optimize network with automatic RF channel settings and adjustments of AP output power setting
- Centrally monitor and manage AP's for a single or multiple remote sites
- Protect against intruders via advanced wireless rogue AP detection algorithms
- Segment guest and corporate access with multiple SSIDs, Guest Captive Portal, and standard based VLAN configurations

Source: <https://www.netgear.com/business/products/wireless/wireless-management/>



Source: http://www.downloads.netgear.com/files/GDC/WC7500/WC_AllModels_UM.pdf, page 44

11. NETGEAR provides a wireless client. For example, the Wireless Management Solution which when equipped with NETGEAR ProSAFE Wireless Access Points (such as WAC 740, 730, 720, WND930 and WN370) provide connectivity for devices (“wireless clients”) which support IEEE 802.11 a/b/g/n/ac standard.

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[ProSAFE Business Wireless Access Points](#)

[ProSAFE Wireless Management](#)



Source: <https://www.netgear.com/business/solutions/organization-size/mid-sized-business/>



**WAC740-4 x 4 Wave 2
Wireless-AC**

Model: WAC740



**WAC730-Business 3 x 3
Wireless-AC**

Model: WAC730



**WAC720-Business 2 x 2
Wireless-AC**

Model: WAC720

☐ Add to compare



**WND930 Outdoor Dual Band
Wireless-N**

Model: WND930

☐ Add to compare



WN370-Wall Mount Wireless-N

Model: WN370

Source: <https://www.netgear.com/business/products/wireless/premium-wireless/>

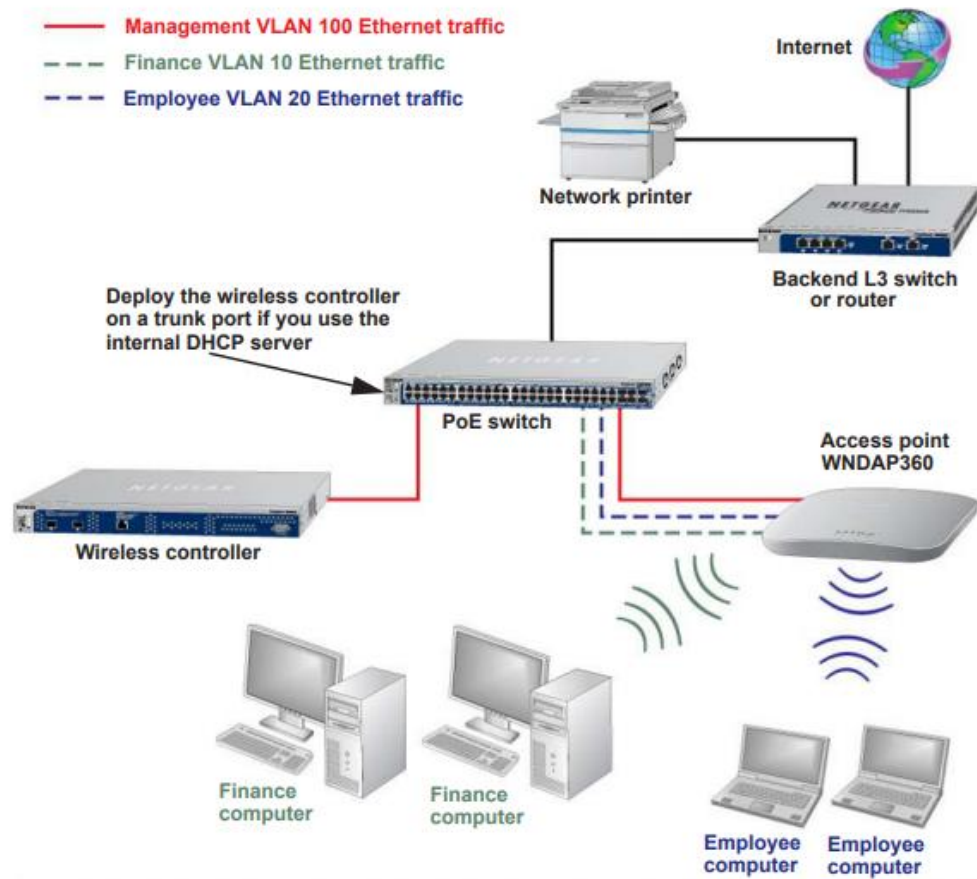
Product Highlights

- Features 802.11ac Wave 2 technology providing a theoretical aggregate throughput of 2.3Gbps—roughly double the rates offered by today's high-end 802.11ac access points
- Reliable wireless coverage with 4 streams of data based on 4x4 (Transmit and Receive) optimized internal antennas
- Multi-user MIMO (MU-MIMO) increases efficiency and capacity – enabling clients to utilize the RF spectrum much more efficiently by allowing multiple-AP-to client transmissions, beamforming, wider bandwidth, and improved encoding
- AirQual feature enables spectrum analysis and interference identification
- Centrally managed by Wireless Controllers
- 2.5GBASE-T Multi-Gigabit support eliminates bottlenecks associated with standard Gigabit Ethernet (NBASE-T switch required to obtain speeds higher than 1Gbps w/ a single port)

Features

- MU-MIMO maximizes the use of wireless medium for delivery of high throughput content
- Compact and elegant design stylishly blends into the environment
- Concurrent operation in 2.4GHz (600Mbps) and 5GHz (1.7Gbps) for maximum wireless throughput
- Backward compatibility with 802.11a, 802.11b, 802.11g, and 802.11n network devices
- Integrated 802.3at Power over Ethernet (PoE+) lowers deployment costs
- Controller managed by WC7500, WC7600 and WC9500 allowing centralized management up to 600 Access Points in a cluster of controllers.
- Business-class security features include WPA, WPA2, rogue AP detection and 802.1x with RADIUS support
- Easy mounting mechanism for quick wall or ceiling installation
- Internal antennas factory-optimized for maximum RF performance
- Antenna take-offs enable optional accessory antenna attachment for 2.4GHz and/or 5GHz operations
- AirQual monitors Wi-Fi channel utilization on the network, identify sources of interference. Log alerts on channel quality drop or overload

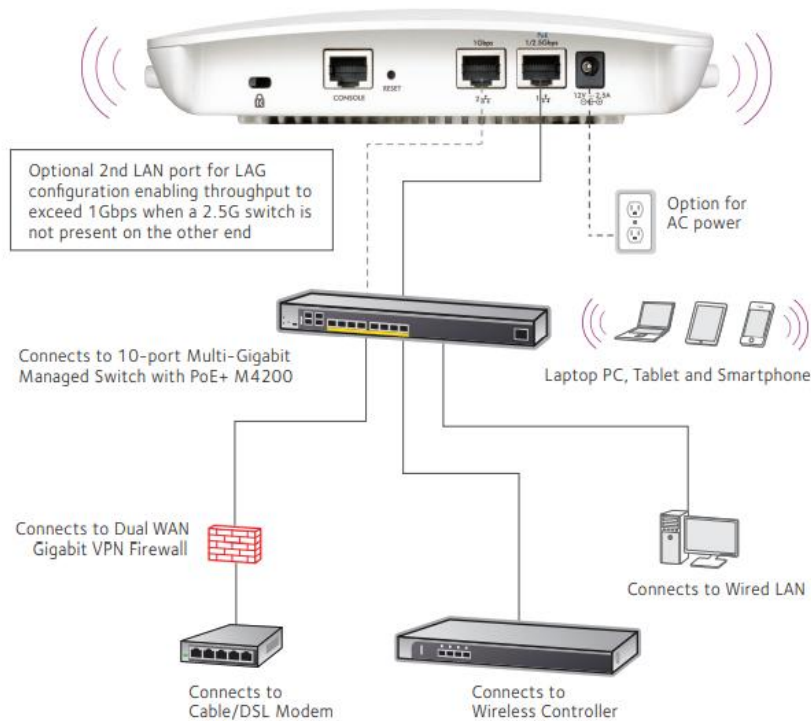
Source: <https://www.netgear.com/images/datasheet/wireless/WAC740.pdf>, page 1



Source: http://www.downloads.netgear.com/files/GDC/WC7500/WC_AllModels_UM.pdf, page 44

Premium 4x4 Dual Band 802.11ac Wave 2 Access Point

Target Applications



Source: <https://www.netgear.com/images/datasheet/wireless/WAC740.pdf>, page 2

12. NETGEAR provides a wireless network. For example, the NETGEAR ProSAFE Wireless Access Points (such as WAC 740, 730, 720, WND930 and WN370) work on the wireless networking standards (such as IEEE 802.11 (WLAN) standard on 2.4 GHz and 5 GHz band frequencies).

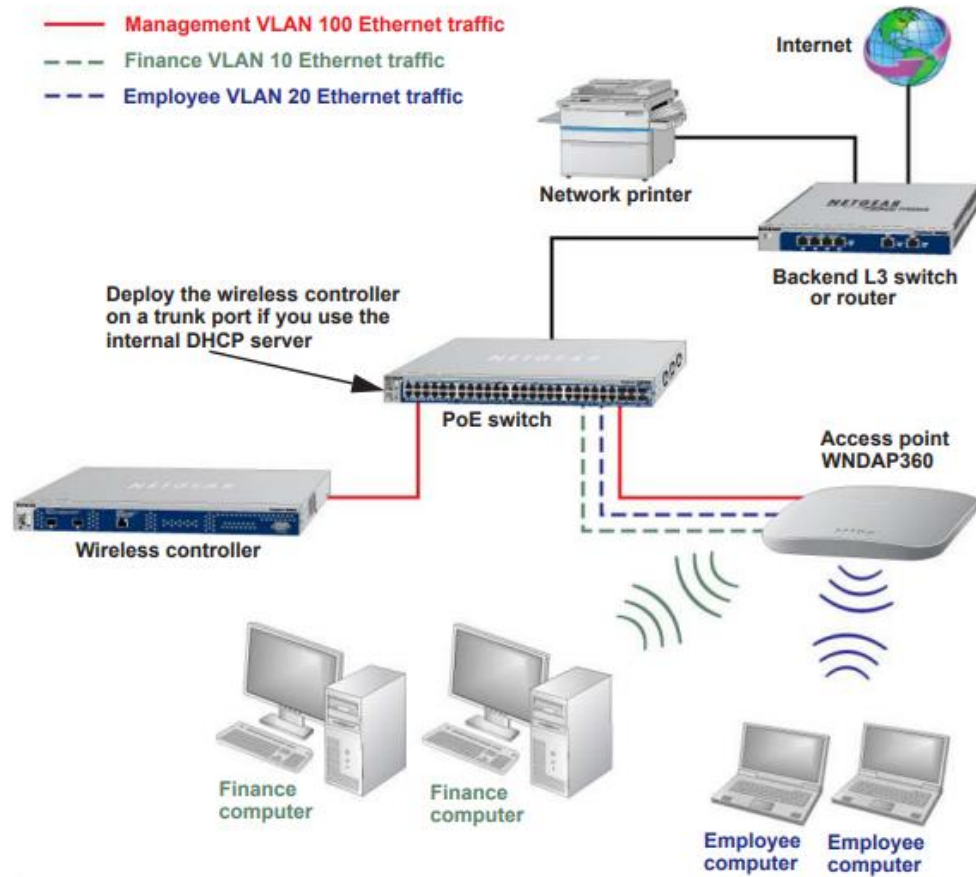
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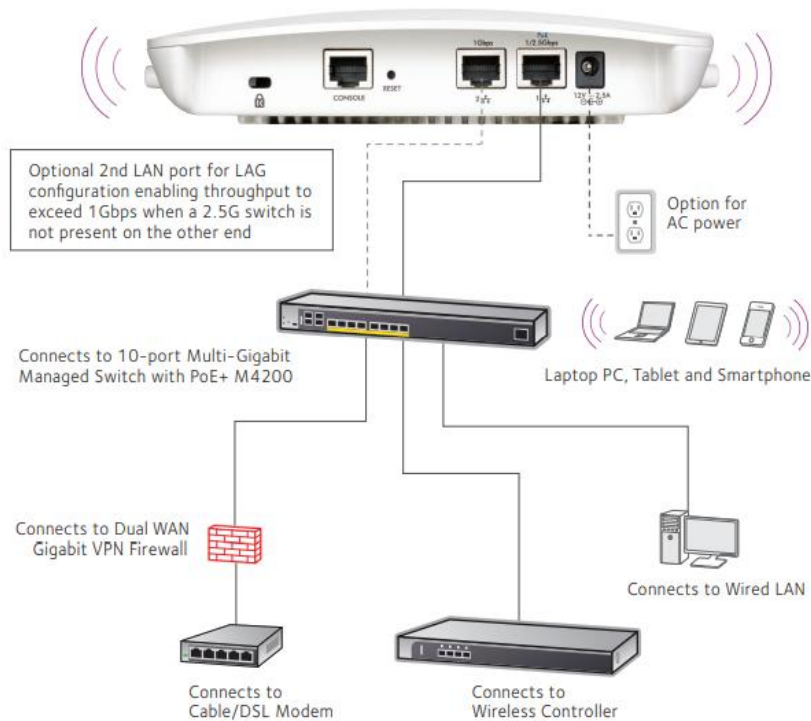
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Source: http://www.downloads.netgear.com/files/GDC/WC7500/WC_AllModels_UM.pdf, page 44

Premium 4x4 Dual Band 802.11ac Wave 2 Access Point

Target Applications



Source: <https://www.netgear.com/images/datasheet/wireless/WAC740.pdf>, page 2

13. NETGEAR provides a land-line client. For example, the Wireless Management Solution comprises NETGEAR ProSAFE Wireless Controllers (such as WAC720/730, WC7500, WC7600, WC9500) and/or NETGEAR Multi-Gigabit Ethernet Smart Managed Pro Switches (such as MS510TX) to support a land-line client.

IEEE AND IETF RFC STANDARDS	
Wired IEEE Standards	<ul style="list-style-type: none"> • IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX, IEEE 802.3ab 1000BASE-T • IEEE 802.1Q VLAN tagging
RFC - System Facilities	<ul style="list-style-type: none"> • RFC 2131 DHCP • RFC 768 UDP • RFC 791 IP • RFC 792 ICMP • RFC 793 TCP • RFC 1519 CIDR • RFC 1542 BOOTP
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Source: https://www.netgear.com/images/pdf/WC7500_DS_30Mar16.pdf, page 6



MS510TX: 8-port Multi-Gigabit Smart Managed Pro Switch with 10G Copper / Fiber Uplinks

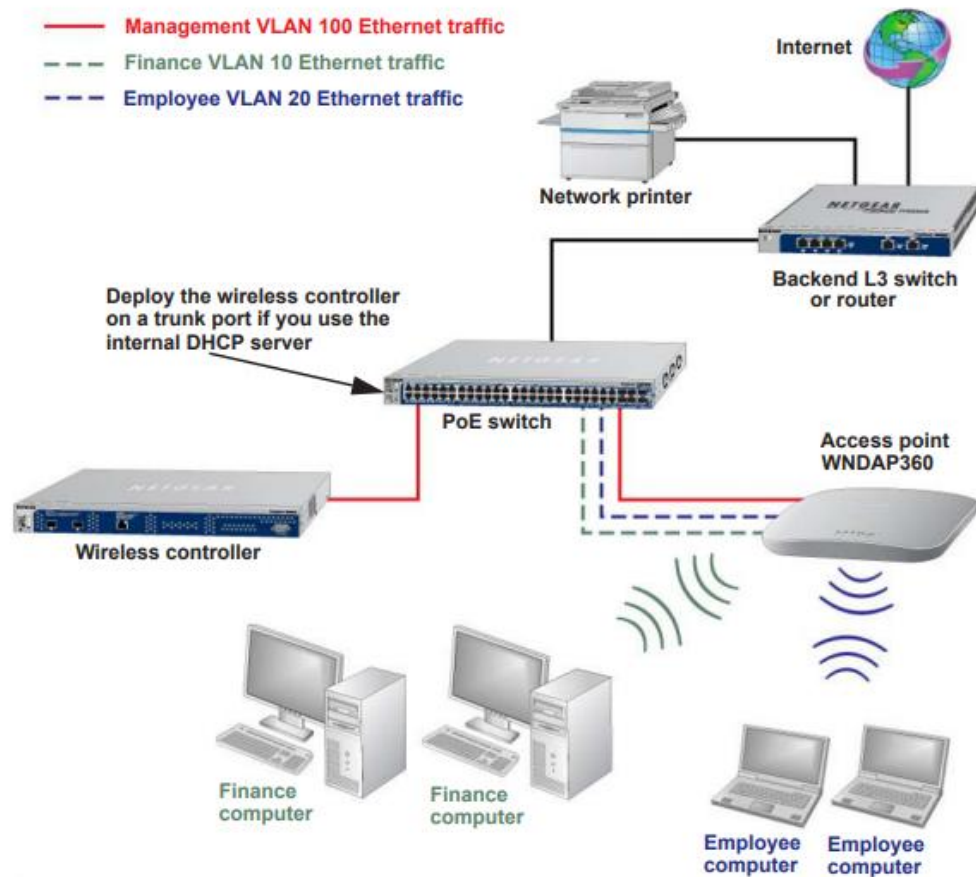
- 2-port RJ-45 Multi-Gigabit Ethernet IEEE 802.3bz (NBASE-T) 100M/1G/2.5G/5G
- 2-port RJ-45 Multi-Gigabit Ethernet IEEE 802.3bz (NBASE-T) 100M/1G/2.5G
- 4-port RJ-45 Gigabit Ethernet 10M/100M/1G
- 1-port RJ-45 10 Gigabit Ethernet Copper (100M/1G/2.5G/5G/10GBASE-T)
- 1-port SFP+ 10 Gigabit Ethernet Fiber (1G/10GBASE-X SFP+)
- 21dB max at 25°C (77°F) ambient



MS510TXPP: 8-port PoE+ Multi-Gigabit Smart Managed Pro Switch with 10G Copper / Fiber Uplinks

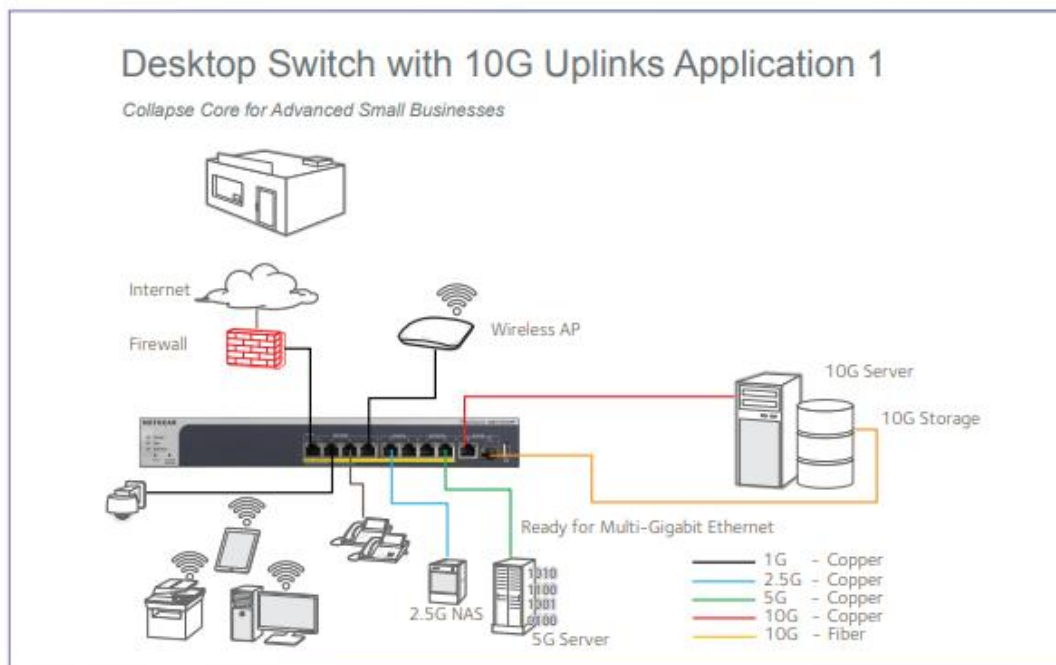
- 2-port RJ-45 Multi-Gigabit Ethernet IEEE 802.3bz (NBASE-T) 100M/1G/2.5G/5G with PoE+
- 2-port RJ-45 Multi-Gigabit Ethernet IEEE 802.3bz (NBASE-T) 100M/1G/2.5G with PoE+
- 4-port RJ-45 Gigabit Ethernet 10M/100M/1G with PoE+
- 1-port RJ-45 10 Gigabit Ethernet Copper (100M/1G/2.5G/5G/10GBASE-T)
- 1-port SFP+ 10 Gigabit Ethernet Fiber (1G/10GBASE-X SFP+)
- 28.8dB max at 25°C (77°F) ambient

Source: <https://www.netgear.com/images/datasheet/switches/MS510TX-MS510TXPP.pdf>, page 2



Source: http://www.downloads.netgear.com/files/GDC/WC7500/WC_AllModels_UM.pdf, page 44

Target Application



Source: <https://www.netgear.com/images/datasheet/switches/MS510TX-MS510TXPP.pdf>, page 5

14. NETGEAR provides a land-line network. For example, the NETGEAR ProSAFE Wireless Controllers (such as WAC720/730, WC7500, WC7600, WC9500) and/or NETGEAR Multi-Gigabit Ethernet Smart Managed Pro Switches (such as MS510TX) support IEEE 802.3 (Ethernet) wired network standard.

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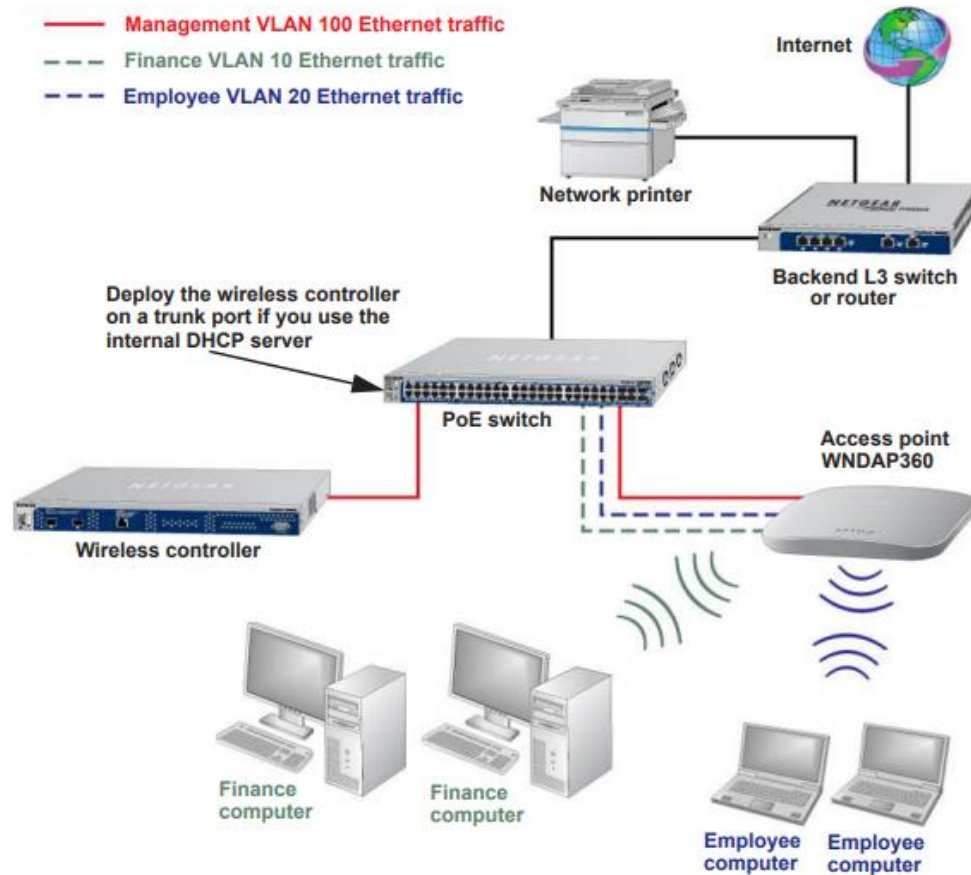
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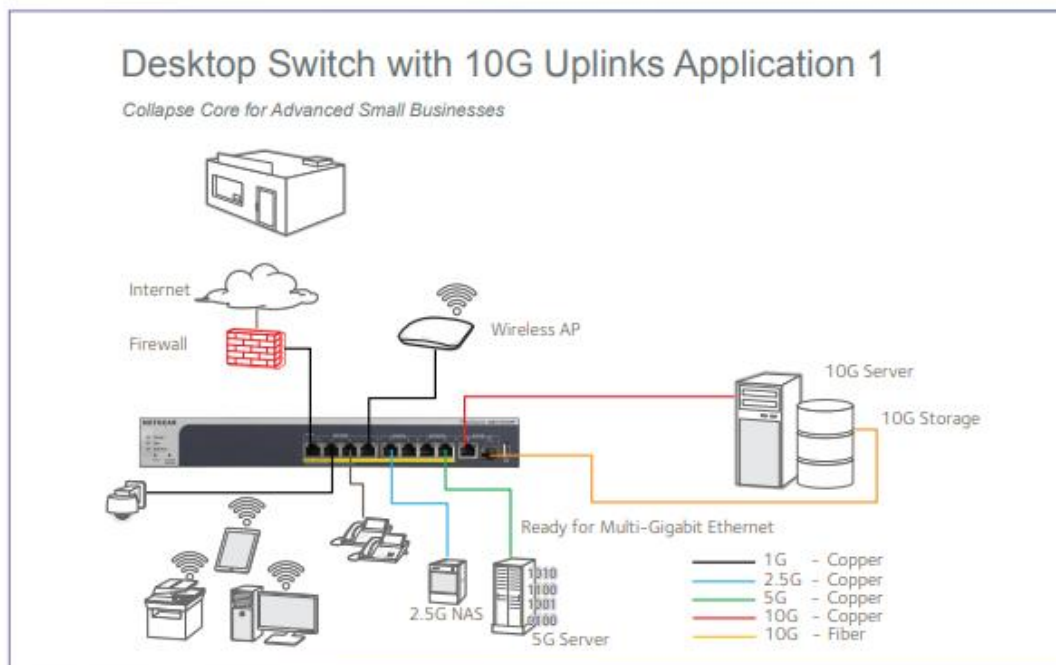
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Source: <https://www.netgear.com/images/datasheet/switches/MS510TX-MS510TXPP.pdf>, page 2



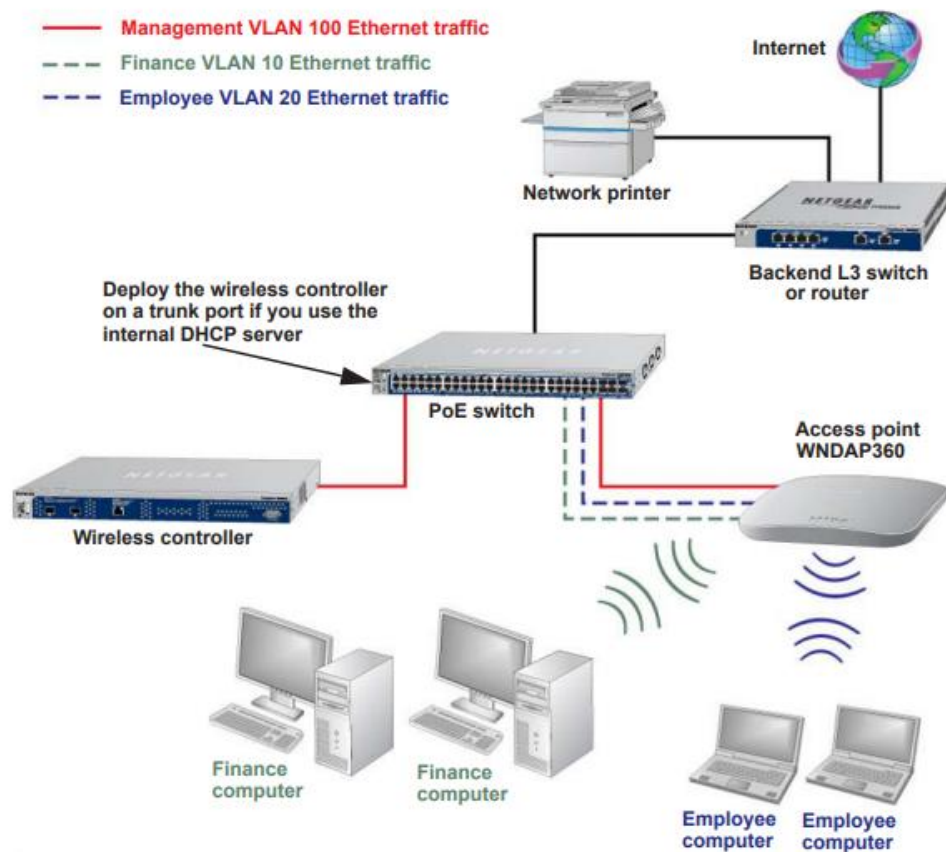
Source: http://www.downloads.netgear.com/files/GDC/WC7500/WC_AllModels_UM.pdf, page 44

Target Application



Source: <https://www.netgear.com/images/datasheet/switches/MS510TX-MS510TXPP.pdf>, page 5

15. NETGEAR provides a network backbone interfacing said land-line network and said wireless network to allow data packets to be exchanged between said wireless client and said land-line client. For example, NETGEAR provides network products (including NETGEAR ProSAFE Wireless Access Points (such as WAC 740, 730, 720, WND930, WN370 and Wireless Controllers such as WAC720/730, WC7500, WC7600 and WC9500) for interfacing a land-line network and a wireless network. The WLAN network products support TCP/IP (Transmission Control Protocol/Internet Protocol) which allow exchange of packets between wireless network and land-line/wired network.



Source: http://www.downloads.netgear.com/files/GDC/WC7500/WC_AllModels_UM.pdf, page 44

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[ProSAFE Business Wireless Access Points](#)

[ProSAFE Wireless Management](#)



Source: <https://www.netgear.com/business/solutions/organization-size/mid-sized-business/>



WC7500

Wireless Controller

Fully-featured, centralized wireless management solution designed for SMB and easy to set up

The WC7500 Controller is a fully-featured centralized wireless management solution with a base support of ten (10) 802.11n and 802.11ac Access Points (APs) with license to upgrade to fifteen (15) AP's. Easy to configure and intuitive to manage, it provides wireless management for small and medium enterprises, primary schools, and small health care customers with minimum total cost of ownership.

Model: WC7500

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Source: <https://www.netgear.com/business/products/wireless/wireless-management/wc7500.aspx>

2. TCP/IP Overview

The generic term "TCP/IP" usually means anything and everything related to the specific protocols of TCP and IP. It can include other protocols, applications, and even the network medium. A sample of these protocols are: UDP, ARP, and ICMP. A sample of these applications are: TELNET, FTP, and rcp. A more accurate term is "internet technology". A network that uses internet technology is called an "internet".

2.1 Basic Structure

To understand this technology you must first understand the following logical structure:

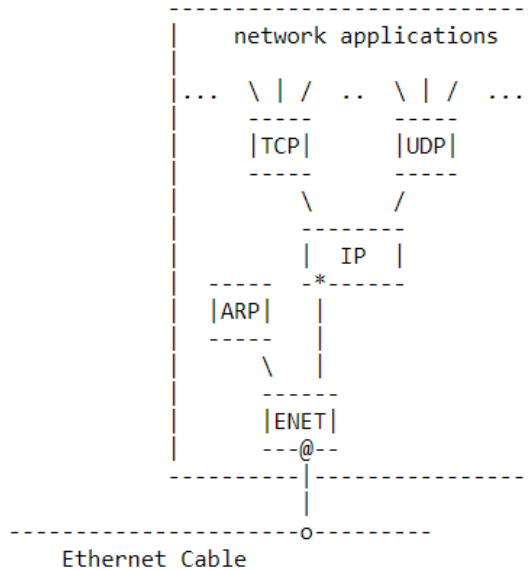


Figure 1. Basic TCP/IP Network Node

Source: <https://tools.ietf.org/html/rfc1180>

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Source: <https://www.netgear.com/images/datasheet/wireless/WAC740.pdf>, page 1

16. NETGEAR provides a communication system using a wireless transport layer protocol for data frame transmission over said land-line and wireless networks, each data frame including connection handling information specifying at least one data transport connection to be used to transmit data between said wireless client and said land-line client over said wireless and land-line networks. For example, NETGEAR provides WLAN network products (including NETGEAR ProSAFE Wireless Access Points such as WAC 740, 730, 720, WND930, WN370 and Wireless Controllers such as WAC720/730, WC7500, WC7600, WC9500) which support wireless protocols such as TCP/IP for transmission of data packets (such as Ethernet frame, IP packet, UDP datagram, and TCP segment and/or application message) over land-line and wireless networks. Further, TCP/IP data frames (such as Ethernet frame) contain connection handling information such as the destination address, source address (“connection addressing information”), type field and data.

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Fully-featured, centralized wireless management solution designed for SMB and easy to set up

The WC7500 Controller is a fully-featured centralized wireless management solution with a base support of ten (10) 802.11n and 802.11ac Access Points (APs) with license to upgrade to fifteen (15) AP's. Easy to configure and intuitive to manage, it provides wireless management for small and medium enterprises, primary schools, and small health care customers with minimum total cost of ownership.

Model: WC7500

GET SUPPORT ▶

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Source: <https://www.netgear.com/business/products/wireless/wireless-management/wc7500.aspx>

IEEE AND IETF RFC STANDARDS	
Wired IEEE Standards	<ul style="list-style-type: none">• IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX, IEEE 802.3ab 1000BASE-T• IEEE 802.1Q VLAN tagging
RFC - System Facilities	<ul style="list-style-type: none">• RFC 2131 DHCP• RFC 768 UDP• RFC 791 IP• RFC 792 ICMP• RFC 793 TCP• RFC 1519 CIDR• RFC 1542 BOOTP
RFC - Security	<ul style="list-style-type: none">• WPA-PSK, WPA2-PSK• IEEE 802.11i• WEP and TKIP-MIC: RC4 40, 104 and 128 bits (both static and shared keys)• AES: CBC, CCM, CCMP• DES: DES-CBC, 3DES• SSL and TLS: RC4 128-bit and RSA 1024- and 2048-bit• DTLS: AES-CBC• IPSec: DES-CBC, 3DES, AES-CBC• RFC 2406 IPsec• RFC 2409 IKE• RFC 3280 Internet X.509 PKI Certificate and CRL Profile• RFC 3602 The AES-CBC Cipher Algorithm and Its Use with IPsec• RFC 3686 Using AES Counter Mode with IPsec ESP• RFC 4347 Datagram Transport Layer Security• RFC 4346 TLS Protocol Version 1.1

Source: https://www.netgear.com/images/pdf/WC7500_DS_30Mar16.pdf, page

6

Product Highlights

- Features 802.11ac Wave 2 technology providing a theoretical aggregate throughput of 2.3Gbps—roughly double the rates offered by today's high-end 802.11ac access points
- Reliable wireless coverage with 4 streams of data based on 4x4 (Transmit and Receive) optimized internal antennas
- Multi-user MIMO (MU-MIMO) increases efficiency and capacity – enabling clients to utilize the RF spectrum much more efficiently by allowing multiple-AP-to client transmissions, beamforming, wider bandwidth, and improved encoding
- AirQual feature enables spectrum analysis and interference identification
- Centrally managed by Wireless Controllers
- 2.5GBASE-T Multi-Gigabit support eliminates bottlenecks associated with standard Gigabit Ethernet (NBASE-T switch required to obtain speeds higher than 1Gbps w/ a single port)

Features

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> • MU-MIMO maximizes the use of wireless medium for delivery of high throughput content • Compact and elegant design stylishly blends into the environment • Concurrent operation in 2.4GHz (600Mbps) and 5GHz (1.7Gbps) for maximum wireless throughput • Backward compatibility with 802.11a, 802.11b, 802.11g, and 802.11n network devices | <ul style="list-style-type: none"> • Integrated 802.3at Power over Ethernet (PoE+) lowers deployment costs • Controller managed by WC7500, WC7600 and WC9500 allowing centralized management up to 600 Access Points in a cluster of controllers. • Business-class security features include WPA, WPA2, rogue AP detection and 802.1x with RADIUS support • Easy mounting mechanism for quick wall or ceiling installation | <ul style="list-style-type: none"> • Internal antennas factory-optimized for maximum RF performance • Antenna take-offs enable optional accessory antenna attachment for 2.4GHz and/or 5GHz operations • AirQual monitors Wi-Fi channel utilization on the network, identify sources of interference. Log alerts on channel quality drop or overload |
|---|--|---|

Source: <https://www.netgear.com/images/datasheet/wireless/WAC740.pdf>, page 1

2.2 Terminology

The name of a unit of data that flows through an internet is dependent upon where it exists in the protocol stack. In summary: if it is on an Ethernet it is called an Ethernet frame; if it is between the Ethernet driver and the IP module it is called a IP packet; if it is between the IP module and the UDP module it is called a UDP datagram; if it is between the IP module and the TCP module it is called a TCP segment (more generally, a transport message); and if it is in a network application it is called a application message.

These definitions are imperfect. Actual definitions vary from one publication to the next. More specific definitions can be found in [RFC 1122, section 1.3.3](#).

A driver is software that communicates directly with the network interface hardware. A module is software that communicates with a driver, with network applications, or with another module.

Source: <https://tools.ietf.org/html/rfc1180>

3. Ethernet

This section is a short review of Ethernet technology.

An Ethernet frame contains the destination address, source address, type field, and data.

An Ethernet address is 6 bytes. Every device has its own Ethernet address and listens for Ethernet frames with that destination address. All devices also listen for Ethernet frames with a wild-card destination address of "FF-FF-FF-FF-FF-FF" (in hexadecimal), called a "broadcast" address.

Ethernet uses CSMA/CD (Carrier Sense and Multiple Access with Collision Detection). CSMA/CD means that all devices communicate on a single medium, that only one can transmit at a time, and that they can all receive simultaneously. If 2 devices try to transmit at the same instant, the transmit collision is detected, and both devices wait a random (but short) period before trying to transmit again.

Source: <https://tools.ietf.org/html/rfc1180>

RFC 1180

A TCP/IP Tutorial

January 1991

4. ARP

When sending out an IP packet, how is the destination Ethernet address determined?

ARP (Address Resolution Protocol) is used to translate IP addresses to Ethernet addresses. The translation is done only for outgoing IP packets, because this is when the IP header and the Ethernet header are created.

4.1 ARP Table for Address Translation

The translation is performed with a table look-up. The table, called the ARP table, is stored in memory and contains a row for each computer. There is a column for IP address and a column for Ethernet address. When translating an IP address to an Ethernet address, the table is searched for a matching IP address. The following is a simplified ARP table:

IP address	Ethernet address
223.1.2.1	08-00-39-00-2F-C3
223.1.2.3	08-00-5A-21-A7-22
223.1.2.4	08-00-10-99-AC-54

TABLE 1. Example ARP Table

The human convention when writing out the 4-byte IP address is each byte in decimal and separating bytes with a period. When writing out the 6-byte Ethernet address, the conventions are each byte in hexadecimal and separating bytes with either a minus sign or a colon.

The ARP table is necessary because the IP address and Ethernet address are selected independently; you can not use an algorithm to translate IP address to Ethernet address. The IP address is selected by the network manager based on the location of the computer on the internet. When the computer is moved to a different part of an internet, its IP address must be changed. The Ethernet address is selected by the manufacturer based on the Ethernet address space licensed by the manufacturer. When the Ethernet hardware interface board changes, the Ethernet address changes.

Source: <https://tools.ietf.org/html/rfc1180#page-2>, page 8

application, the TCP module, and the IP module. At this point the IP packet has been constructed and is ready to be given to the Ethernet driver, but first the destination Ethernet address must be determined.

The ARP table is used to look-up the destination Ethernet address.

4.3 ARP Request/Response Pair

But how does the ARP table get filled in the first place? The answer is that it is filled automatically by ARP on an "as-needed" basis.

Two things happen when the ARP table can not be used to translate an address:

1. An ARP request packet with a broadcast Ethernet address is sent out on the network to every computer.
2. The outgoing IP packet is queued.

Every computer's Ethernet interface receives the broadcast Ethernet frame. Each Ethernet driver examines the Type field in the Ethernet frame and passes the ARP packet to the ARP module. The ARP request packet says "If your IP address matches this target IP address, then please tell me your Ethernet address". An ARP request packet looks something like this:

```

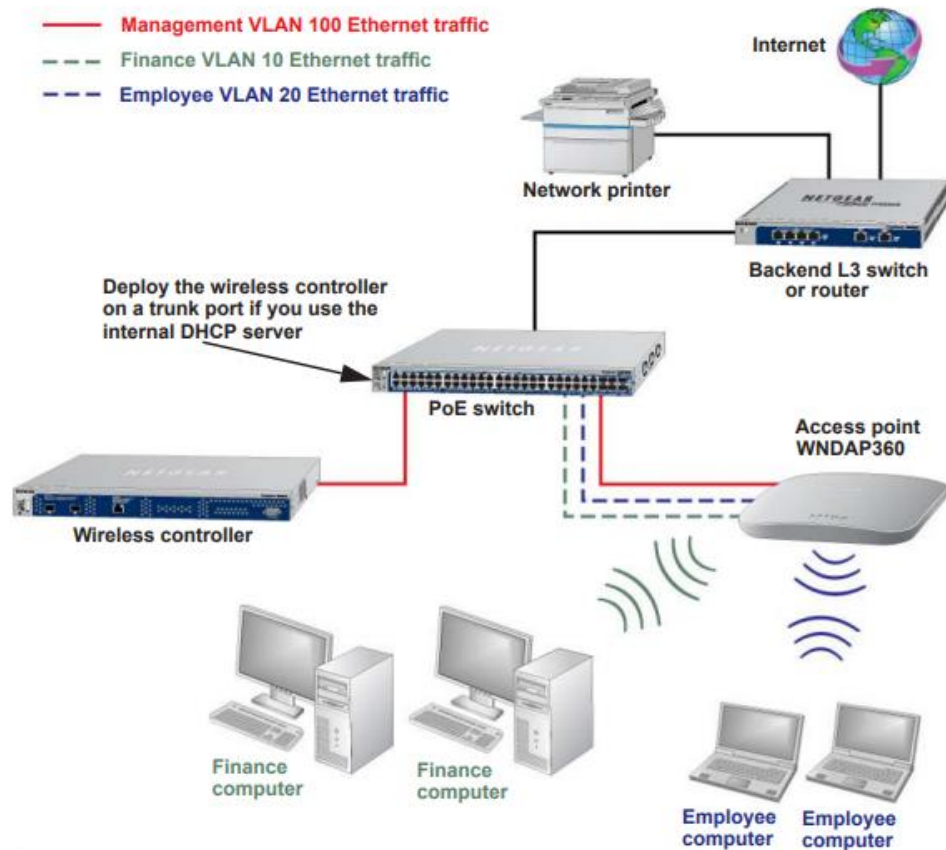
-----
|Sender IP Address  223.1.2.1      |
|Sender Enet Address 08-00-39-00-2F-C3|
-----
|Target IP Address  223.1.2.2      |
|Target Enet Address <blank>       |
-----

```

TABLE 2. Example ARP Request

Each ARP module examines the IP address and if the Target IP address matches its own IP address, it sends a response directly to the source Ethernet address. The ARP response packet says "Yes, that target IP address is mine, let me give you my Ethernet address". An ARP response packet has the sender/target field contents swapped as compared to the request. It looks something like this:

Source: <https://tools.ietf.org/html/rfc1180#page-2>, page 9



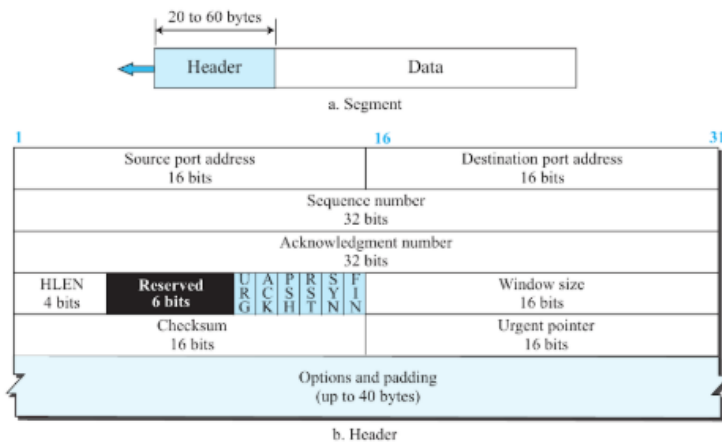
Source: http://www.downloads.netgear.com/files/GDC/WC7500/WC_AllModels_UM.pdf, page 44

17. NETGEAR provides a user data field including a data packet to be transmitted from one client to another client. For example, the network products (including NETGEAR ProSAFE Wireless Access Points such as WAC 740, 730, 720, WND930, WN370 and Wireless Controllers such as WAC720/730, WC7500, WC7600, WC9500) support wireless transport protocol such as TCP/IP. The protocol allows transmission of user data from one client to another client in the form of TCP segments/data packets.

CHAPTER 3 TRANSPORT LAYER

there are no options and up to 60 bytes if it contains options. We will discuss some of the header fields in this section. The meaning and purpose of these will become clearer as we proceed through the section.

Figure 3.44 TCP segment format



Source:

<https://books.google.co.in/books?id=o8CjAgAAQBAJ&printsec=frontcover&dq=forouzan+computer+networks&hl=en&sa=X&ved=0ahUKEwjV95WPruPhAhVFQo8KHWsUBtsQ6AEIKDAA#v=onepage&q=forouzan%20computer%20networks&f=false>, page 186

18. NETGEAR provides at least one sequencing field identifying the last packet received by the client that is transmitting a current data packet. For example, the WLAN network products (including NETGEAR ProSAFE Wireless Access Points such as WAC 740, 730, 720, WND930, WN370 and Wireless Controllers such as WAC720/730, WC7500, WC7600, WC9500) support wireless protocols such as TCP/IP for transmission. Further, TCP/IP uses sequence numbers and acknowledgement numbers for maintaining the sequence of the packets. Initial Sequence Number (ISN) is given to the first byte of the data to reassemble the bytes at the receiver end. Acknowledgement number ("sequencing field") is the next byte number that the receiver expects to receive which also provides acknowledgement for receiving the previous bytes/packets.

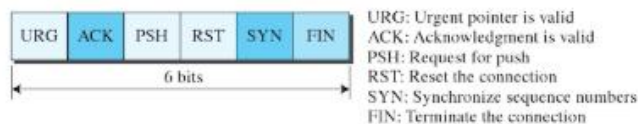
- ❑ **Source port address.** This is a 16-bit field that defines the port number of the application program in the host that is sending the segment.
- ❑ **Destination port address.** This is a 16-bit field that defines the port number of the application program in the host that is receiving the segment.
- ❑ **Sequence number.** This 32-bit field defines the number assigned to the first byte of data contained in this segment. As we said before, TCP is a stream transport protocol. To ensure connectivity, each byte to be transmitted is numbered. The sequence number tells the destination which byte in this sequence is the first byte in the segment. During connection establishment (discussed later) each party uses a random number generator to create an **initial sequence number** (ISN), which is usually different in each direction.
- ❑ **Acknowledgment number.** This 32-bit field defines the byte number that the receiver of the segment is expecting to receive from the other party. If the receiver of the segment has successfully received byte number x from the other party, it returns $x + 1$ as the acknowledgment number. Acknowledgment and data can be piggybacked together.
- ❑ **Header length.** This 4-bit field indicates the number of 4-byte words in the TCP header. The length of the header can be between 20 and 60 bytes. Therefore, the value of this field is always between 5 ($5 \times 4 = 20$) and 15 ($15 \times 4 = 60$).

Source:

<https://books.google.co.in/books?id=o8CjAgAAQBAJ&printsec=frontcover&dq=forouzan+computer+networks&hl=en&sa=X&ved=0ahUKEwjV95WPruPhAhVFQo8KHWsUBtsQ6AEIKDAA#v=onepage&q=forouzan%20computer%20networks&f=false>, page 186

- ❑ **Control.** This field defines 6 different control bits or flags, as shown in Figure 3.45. One or more of these bits can be set at a time. These bits enable flow control, connection establishment and termination, connection abortion, and the mode of data transfer in TCP. A brief description of each bit is shown in the figure. We will discuss them further when we study the detailed operation of TCP later in the chapter.

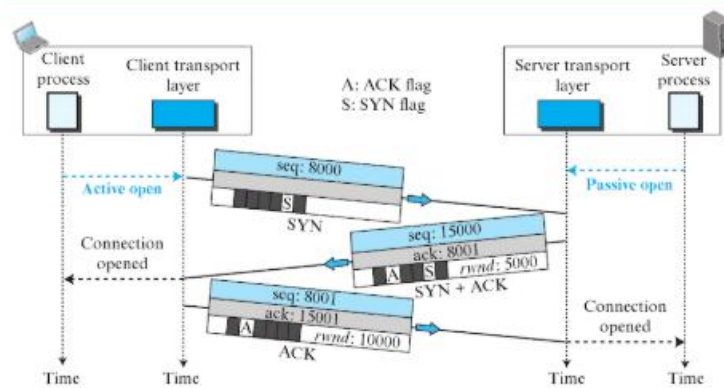
Figure 3.45 Control field



Source:

<https://books.google.co.in/books?id=o8CjAgAAQBAJ&printsec=frontcover&dq=forouzan+computer+networks&hl=en&sa=X&ved=0ahUKEwjV95WPruPhAhVFQo8KHWsUBtsQ6AEIKDAA#v=onepage&q=forouzan%20computer%20networks&f=false>, page 187

Figure 3.47 Connection establishment using three-way handshaking



number, the control flags (only those that are set), and window size if relevant. The three steps in this phase are as follows.

1. The client sends the first segment, a SYN segment, in which only the SYN flag is set. This segment is for synchronization of sequence numbers. The client in our example chooses a random number as the first sequence number and sends this number to the server. This sequence number is called the initial sequence number (ISN). Note that this segment does not contain an acknowledgment number. It does not define the window size either; a window size definition makes sense only when a segment includes an acknowledgment. The segment can also include some options that we discuss later in the chapter. Note that the SYN segment is a control segment and carries no data. However, it consumes one sequence number because it needs to be acknowledged. We can say that the SYN segment carries one imaginary byte.

A SYN segment cannot carry data, but it consumes one sequence number.

Source:

<https://books.google.co.in/books?id=o8CjAgAAQBAJ&printsec=frontcover&dq=forouzan+computer+networks&hl=en&sa=X&ved=0ahUKEwjV95WPruPhAhVFQo8KHWsUBtsQ6AEIKDAA#v=onepage&q=forouzan%20computer%20networks&f=false>, page 189

2. The server sends the second segment, a SYN + ACK segment with two flag bits set as: SYN and ACK. This segment has a dual purpose. First, it is a SYN segment for communication in the other direction. The server uses this segment to initialize a sequence number for numbering the bytes sent from the server to the client. The server also acknowledges the receipt of the SYN segment from the client by setting the ACK flag and displaying the next sequence number it expects to receive from the client. Because it contains an acknowledgment, it also needs to define the receive window size, *rwnd* (to be used by the client), as we will see in the flow control section. Since this segment is playing the role of a SYN segment, it needs to be acknowledged. It, therefore, consumes one sequence number.

**A SYN + ACK segment cannot carry data,
but it does consume one sequence number.**

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3 TRANSPORT LAYER

3. The client sends the third segment. This is just an ACK segment. It acknowledges the receipt of the second segment with the ACK flag and acknowledgment number field. Note that the ACK segment does not consume any sequence numbers if it does not carry data, but some implementations allow this third segment in the connection phase to carry the first chunk of data from the client. In this case, the segment consumes as many sequence numbers as the number of data bytes.

An ACK segment, if carrying no data, consumes no sequence number.

Source:

<https://books.google.co.in/books?id=o8CjAgAAQBAJ&printsec=frontcover&dq=forouzan+computer+networks&hl=en&sa=X&ved=0ahUKEwjV95WPruPhAhVFQo8KHWSUBtsQ6AEIKDAA#v=onepage&q=forouzan%20computer%20networks&f=false>, page 190

19. In the alternative, because the manner of use by Defendant differs in no substantial way from language of the claims, if Defendant is not found to literally infringe, Defendant infringes under the doctrine of equivalents.

20. Defendant's aforesaid activities have been without authority and/or license from Plaintiff.

21. In addition to what is required for pleadings in patent cases, and to the extent any marking was required by 35 U.S.C. § 287, Plaintiff and all predecessors in interest to the '095 Patent complied with all marking requirements under 35 U.S.C. § 287.

22. Plaintiff is entitled to recover from Defendant the damages sustained by Plaintiff as a result of the Defendant's wrongful acts in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests that this Court enter:

1. A judgment in favor of Plaintiff that Defendant has infringed the '813 Patent;
2. A judgment and order requiring Defendant to pay Plaintiff its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the '813 Patent as provided under 35 U.S.C. § 284;
3. An award to Plaintiff for enhanced damages resulting from the knowing, deliberate, and willful nature of Defendant's prohibited conduct with notice being made at least as early as the date of the filing of this Complaint, as provided under 35 U.S.C. § 284;
4. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys' fees; and
5. Any and all other relief to which Plaintiff may show itself to be entitled.

DEMAND FOR JURY TRIAL

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Respectfully Submitted,

WIRELESS TRANSPORT LLC

/s/ Jimmy Chong

Dated: July 29, 2019

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