

# Voice over Internet Protocol VoIP



**Homeland  
Security**

# Performance Objective

The student will know the meaning of Voice over Internet Protocol (VoIP) and how it works. Also, the student will learn what information can be obtained from VoIP Providers, when they are presented with the proper Court Orders.

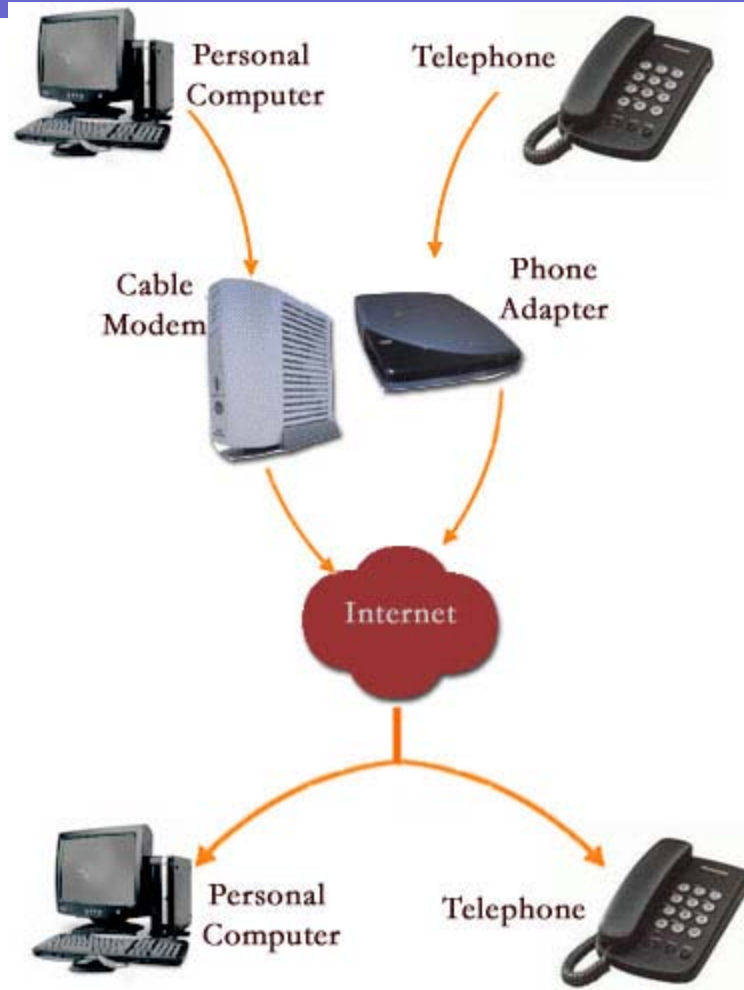


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# Voice over Internet Protocol - VoIP

- What is Voice over Internet Protocol?
- VoIP is the method of taking analog audio signals and turning them into digital signals that can be transmitted over the Internet.
- VoIP allows for data transmissions between two devices that have the required level of compatibility

# Voice over Internet Protocol - VoIP



# Voice over Internet Protocol - VoIP

- What is Voice over Internet Protocol?
- VoIP holds great promise – it has already changed the way we communicate
  - Handheld Video Conference – Video Phones
- VoIP can integrate various types of digital signals into a single package allowing various types to be seen as one.

# Voice over Internet Protocol - VoIP

- The Origin of VoIP

- The Courts ruling that other devices, such as modems, could be connected to existing PSTN paved the way for new applications and inventions
- This set the stage for VoIP
  - *Note: Carterfone v AT&T 250 F.Supp. N.D. Texas*

# Voice over Internet Protocol - VoIP

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- Applications of VoIP

- PC to PC Voice Communication
- IP Phone to PC Voice communication
- IP Phone to IP Phone Voice communication
- IP Phone to Phone Communication
- Integrated with other protocols to supply multi media capabilities

# Voice over Internet Protocol - VoIP

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- How Does It Work – Data Conversion
- Analog Telephone Adaptor (ATA)
  - Using a vendor supplied equipment to convert the analog voice signal into a digital signal allowing it to be transmitted over the Internet
  - Connect a stand alone telephone into the adaptor and the adaptor into your computer or your internet connection



# Voice over Internet Protocol - VoIP

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- How Does It Work – Data Conversion
- IP Telephones
  - Specialized telephone that looks like a normal telephone. Headset, cradle, keypad, etc.
  - Has an Ethernet connector to connect directly to your Internet connection
  - All the software for conversion is contained within

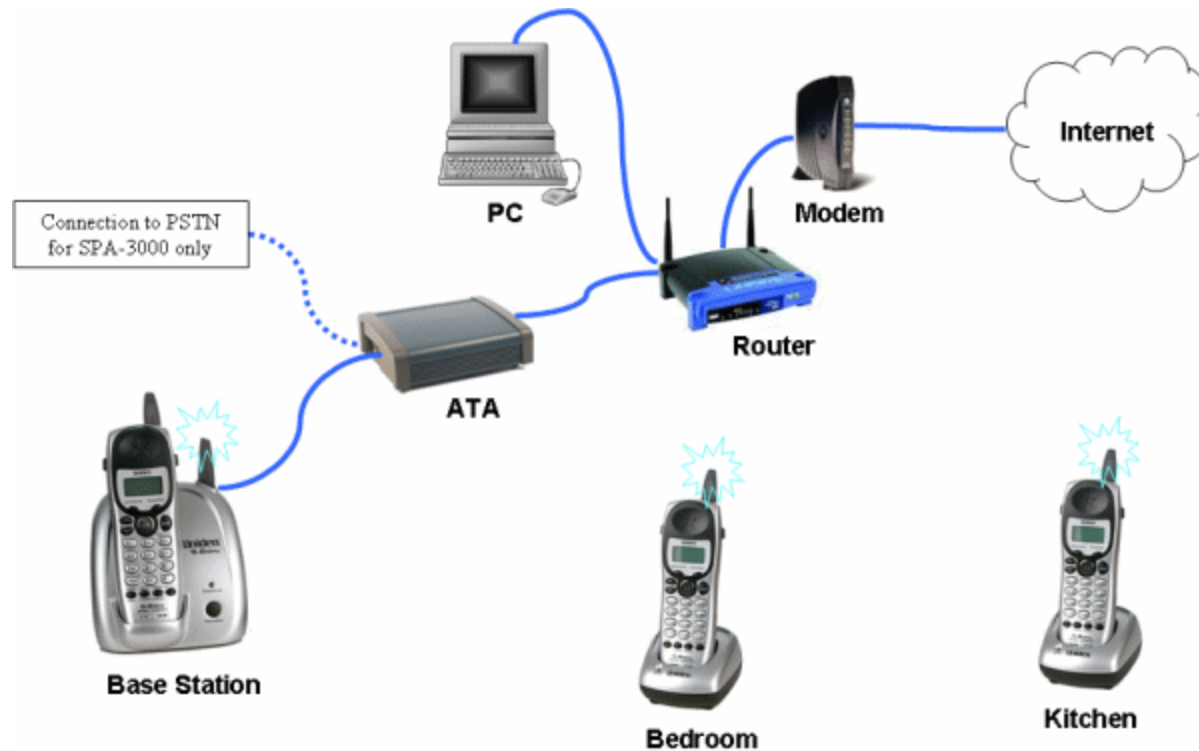
# Voice over Internet Protocol - VoIP

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- How Does It Work – Data Conversion
  - Computer to Computer Software
    - The easiest way to use VoIP
    - Need only a sound card, microphone, earpiece or head set
    - Works directly with existing software to convert

# Voice over Internet Protocol - VoIP

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# Voice over Internet Protocol - VoIP

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- How Does It Work – Data Conversion
  - Your voice is converted into language your computer understands
  - Your computer only understands 1's and 0's
  - These voices signals or frames are converted into data packets or datagrams

# Voice over Internet Protocol - VoIP

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## □ How Does It Work – Data Packets

- The Data Packets consists of numerous parts with each playing a role in it's delivery
- They are conveyed across the Internet through Packet Switching Networks, whose job is to ensure the delivery of the packets

# Voice over Internet Protocol - VoIP

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- How Does It Work – Data Packets
- Most Data Packets are split into three (3) parts
  - The Header
  - The Payload
  - The Trailer

# Voice over Internet Protocol - VoIP

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## □ How Does It Work – Data Packets

- The Header contains instructions about the data and how it is to be delivered.
- This information includes:
  - Length of the packet      Protocol Used
  - Synchronization          Payload
  - Packet Number              Originating Address
  - Destination Address

# Voice over Internet Protocol - VoIP

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## □ How Does It Work – Data Packets

- Length of the Packet – Some networks have fixed lengths
- Synchronization – Bits that help the packet match up to the network
- Packet Number – Which packet this is in the sequence of packets



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## □ How Does It Work – Data Packets

- Protocols – Defines what type of packet is being delivered
- Destination Address – Where the packet is going
- Originating Address – Where the packet came from

# Voice over Internet Protocol - VoIP

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## □ How Does It Work – Data Packets

- The Payload is also called the body or the data. This is the actual data or 1's and 0's that are being delivered
- If the packet is a fixed length then any remaining space must be padded

# Voice over Internet Protocol - VoIP

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## □ How Does It Work – Data Packets

- The Trailer or footer typically contains information that tells the receiving machine it has received the last packet.
- Error checking (CRC) is also typically included to make sure the delivery was completed without errors.

# Voice over Internet Protocol - VoIP

## ■ How Does It Work – Caller

- ❑ Using the ATA model, you pick up the receiver which tells the ATA you have a request. The ATA sends you a dial tone letting you know you are connected to the Internet.
- ❑ You dial the number you want to speak with, which is then stored in cache

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# Voice over Internet Protocol - VoIP

## ■ How Does It Work – Caller

- ❑ A request is sent to your VoIP companies (Vonage) call processor
- ❑ The call processor locates the correct map for the number

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# Voice over Internet Protocol - VoIP

## ■ How Does It Work – Caller

- ❑ When located, the number is converted to an IP address
- ❑ The soft switch connects the two devices and a signal is sent to the other ATA telling it to ring

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# Voice over Internet Protocol - VoIP

## ■ How Does It Work – Receiver

- ❑ Once the other party picks up the device the circuit is complete
- ❑ The voice packets are sent across the Internet
- ❑ The other devices use the codec to convert the 1's and 0's to voice

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# Voice over Internet Protocol - VoIP

- How Does It Work – Protocol Recognition
  - As previously discussed there are standards that computers use to tell them how to interpret the 1's and 0's
  - These standards are contained within the various Protocols used in c/w data.



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# Voice over Internet Protocol - VoIP

- How Does It Work – Protocol Recognition
  - The standards are set by the International Standards Organization (ISO) and are followed worldwide for seamless integration
  - There are other standards organizations that deal with other aspects of Internet usage

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# Voice over Internet Protocol - VoIP

## ■ How Does It Work – IP Mapping

- ❑ The Central Call Processor is a piece of hardware that runs a special database or mapping program called a Soft Switch
- ❑ The Soft Switch connects the users and phone. The user and phone are called endpoints

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# Voice over Internet Protocol - VoIP

## ■ How Does It Work – IP Mapping

- ❑ When a request is made the Soft Switch searches its database for the endpoint
- ❑ If it's not on its database it searches the Internet until it locates the database that has the information

# Voice over Internet Protocol - VoIP

## ■ How Does It Work – IP Mapping

### □ Soft Switch E.164 Standard

(912) 555-1212

912 = State

555 = City

1212 = Address

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# Voice over Internet Protocol - VoIP

- How Does It Work – IP Mapping

- That information includes

- Where The endpoint is on the network
- What phone number is associated with that endpoint
- The current IP Address assigned to that endpoint
- This makes it possible to connect via the Internet

# Voice over Internet Protocol - VoIP

## ■ How Does It Work – Delivery Process

(b)(7)e

# Voice over Internet Protocol - VoIP

## Cell Phone Call

(b)(7)e

# Voice over Internet Protocol - VoIP

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## Various Flavor

- Bell System

- Offers lower rates for Long Distance Service if you subscribe to their Digital Subscriber Line (ADSL/SDSL)



# Voice over Internet Protocol - VoIP

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## Various Flavor

### ☐ Free Services

#### ☒ Skpye

- ☐ Free PC to PC with software
- ☐ Short Message Service (SMS)
- ☐ Video Calls
- ☐ Group Chat – 100 People
- ☐ Conference Calls – 4 People

# Voice over Internet Protocol - VoIP

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## Various Flavor

### ☐ Free Services –

#### ☒ Vbuzzer

- ☐ Instant Messaging
- ☐ Free PC to PC with software
- ☐ Free Voice Mail
- ☐ Connects to Windows Live Messenger

# Voice over Internet Protocol - VoIP

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## Various Flavor

- ☐ Pay Services

- Vonage

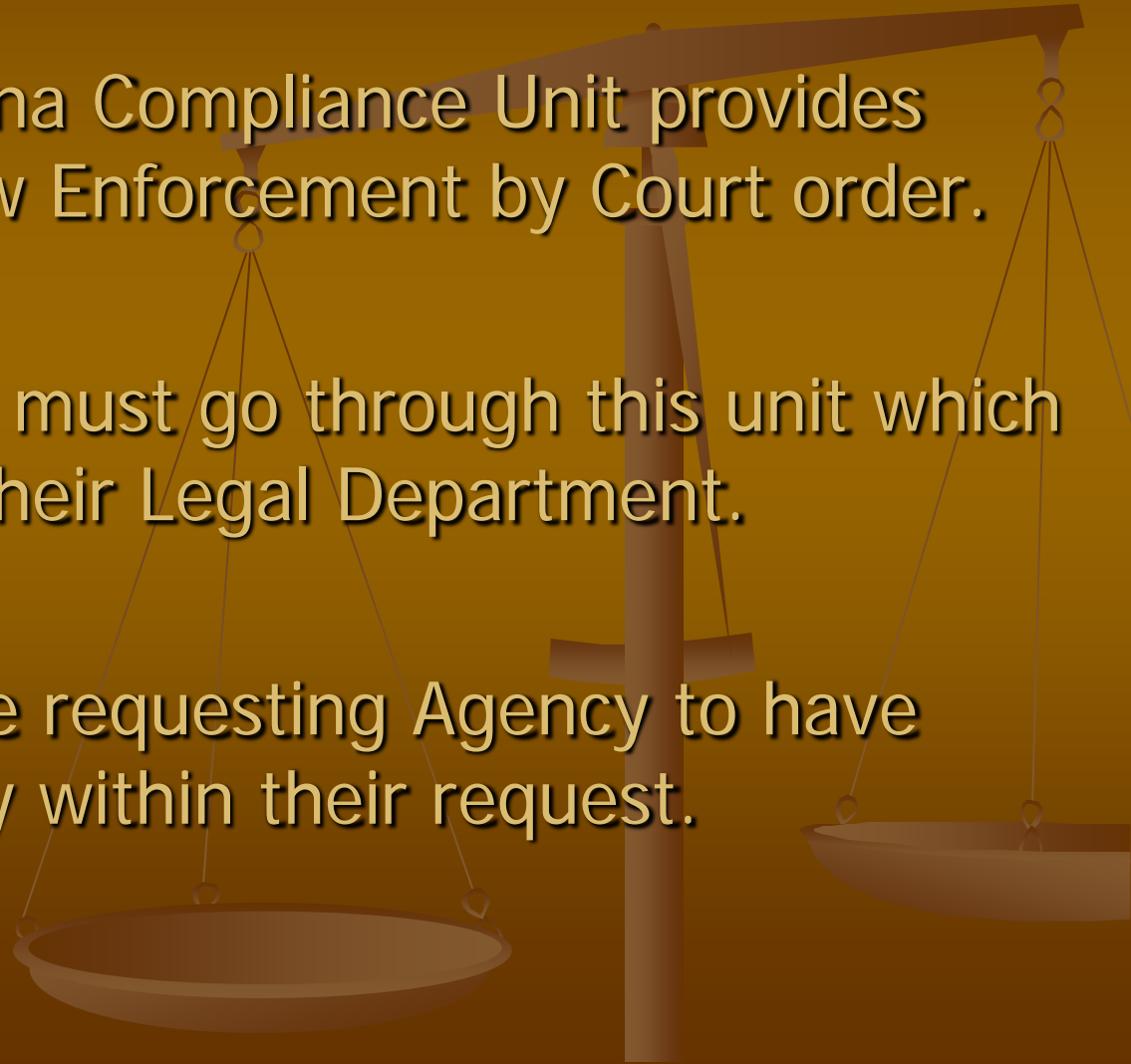
- ☐ Connects and interacts with computer
    - ☐ Uses it's own equipment
    - ☐ Creates file artifacts

# Obtaining Information From Vonage

Vonage Subpoena Compliance Unit provides information to Law Enforcement by Court order.

Information request must go through this unit which is part of their Legal Department.

Vonage asks the requesting Agency to have specificity within their request.



# Obtaining Information From Vonage

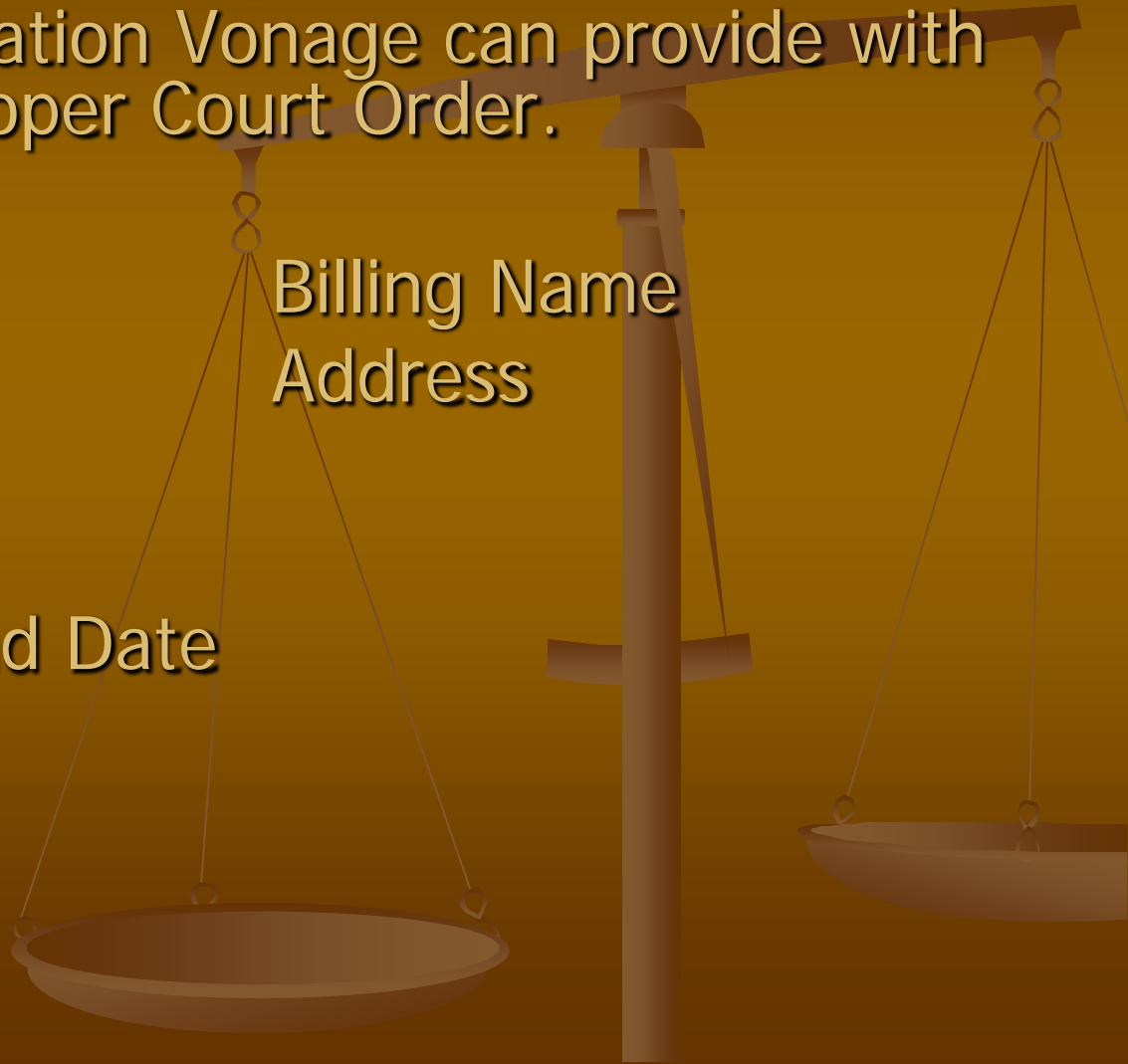
The Type of information Vonage can provide with the proper Court Order.

Subscriber's Name  
Address

Billing Name  
Address

Telephone Number  
Account start and End Date

Shipping Name  
Address



# Obtaining Information From Vonage

The Type of information Vonage can provide with the proper Court Order.

Credit Card Information

Call Detail Records

Including session times  
and IP History

Types of Services Used

IP Address

MAC Address

Email Address

Contact Information



# Obtaining Information From Vonage

The Type of information Vonage can provide with the proper Court Order.

Be Specific!!!

When requesting call detail records and subscriber information specify a time frame, i.e. 12/6/2006 through 2/6/2007.



# Obtaining Information From Vonage

When requesting credit card information make clear the card number, i.e. Master Card Credit Card Number ##### ##### #####

The same holds true for IP Addresses, i.e. "any and all information currently held as it relates IP Address ###.###.##.##

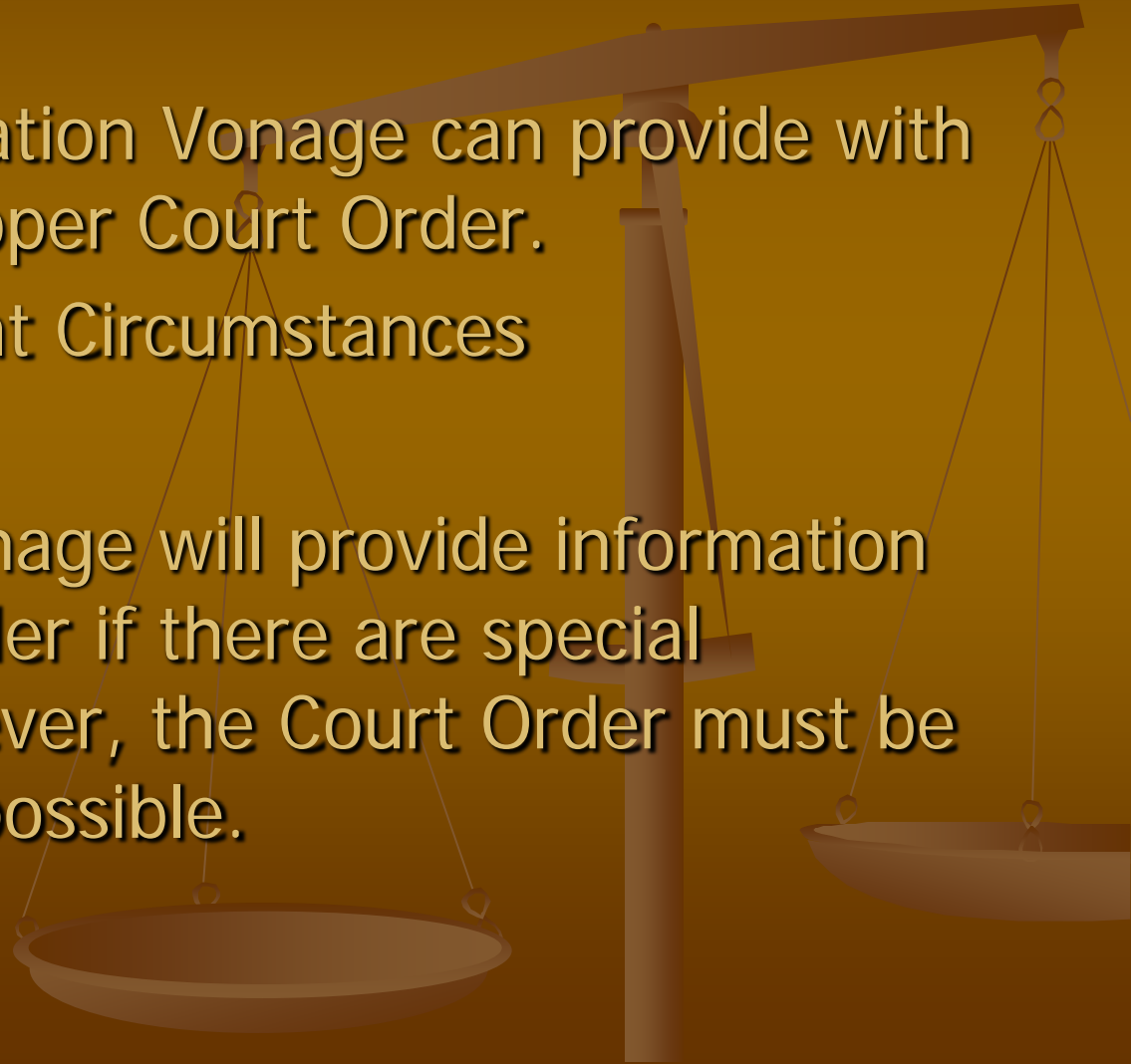


# Obtaining Information From Vonage

The Type of information Vonage can provide with the proper Court Order.

Exigent Circumstances

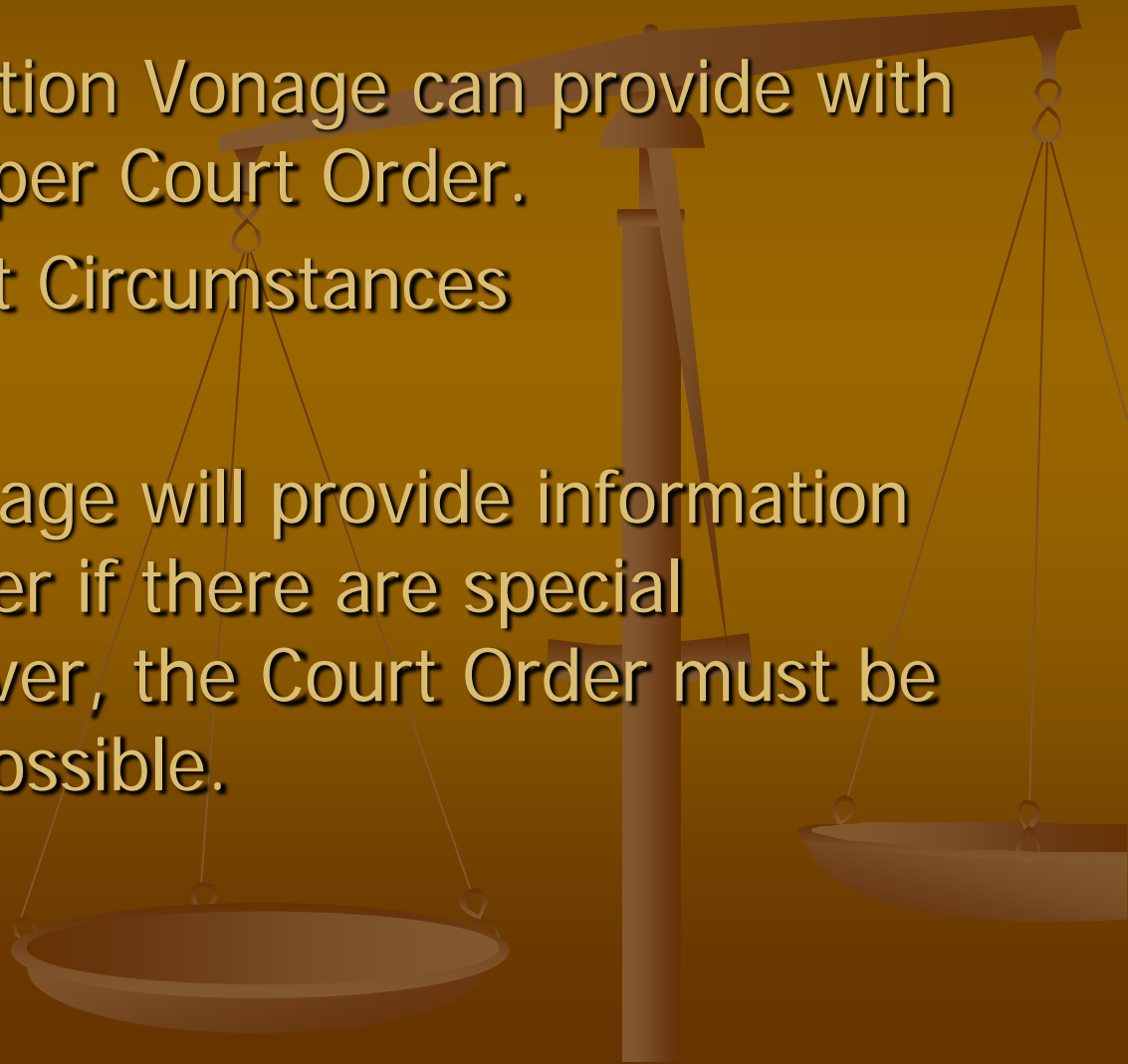
Like most carriers Vonage will provide information without the Court Order if there are special circumstances. However, the Court Order must be provided as soon as possible.



# Obtaining Information From Vonage

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# Obtaining Information From Vonage

The Type of information Vonage can provide with the  
proper Court Order.  
Exigent Circumstances

Vonage defines Exigent Circumstances as a life threatening situation (e.g. potential suicides, bomb threats, kidnapping, hostage situations or the like).

Don't Abuse!!! – They will remember you and your Agency.

# Obtaining Information From Vonage

## Contact Information

Vonage Holding Company  
Legal Department  
23 Main Street  
Holmdel, N.J.

Attn.: Tramel Sumner, Legal Affairs Administrator

Business Number: (732) 231-6705

Fax Number: (732) 202-5221

After Hours Contact (**Exigent Circumstances Only**):

**(732) 202-5221**



# Review

1. VoIP is a method of delivering voice communications over the Internet
2. There are a number of ways to achieve VoIP, including PC to PC and the use of IP Phone
3. Data Packets travel the Internet. When packets are received they are converted back to voice communication
4. You can obtain VoIP as a Pay Service or you can obtain limited services free



# Homeland Security