Communications Magic

A Brief History of the Evolution of Voice Communications

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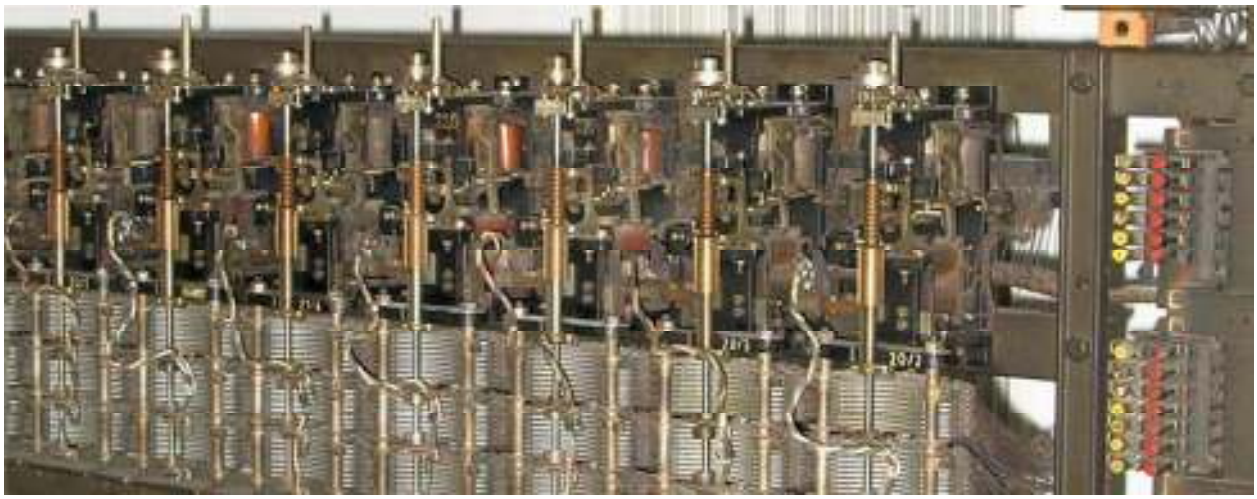
Communications have evolved from written word, to electronic signals, to voice communications and back again. Time has created new ways to reach others and deliver messages. The delivery has changed, the desire to communicate has not. Below are examples of how different types of paths have been used and may be used in the future to deliver those communications.

Terrestrial Voice

Operators and Open Wire

Voice call 1904. It was crank phone with battery in phone or basement. You would crank the phone to light a bulb in an operator station or "central". The operator placed a cord between you and the house to call and cranked to ring bells on the phone. When one person spoke into the mouth piece, it was changed to an electrical current over the open wire or party lines to the central, then back over the open wires to other end. Then from a crank style phone on the other end, direct current (DC) from the batteries was sent to the ear piece of the phone on the other end where the ear piece converted the DC electrical current into analog voice where the ear could hear it.

Dial Rotary Phone, Copper Wire, and Mechanical Switch



Voice call 1974. A rotary dial phone with battery in the central office on a mechanical switch would dial the 7 digit number of the person you want to call in the same area. The central office connects the lines

or pairs together and sends ring current to ring the bells in the dial phone over the copper pairs. When answered, the central office provides DC current to both parties. When one of them spoke, the mouth piece converts the analog sound to current. It is then sent to the rotary dial phone on the other end over the wires from the central office on DC current from batteries in the central office. The ear piece converts the current into analog voice where the ear could hear it.

Touch Tone Phone, Copper Wire and Mechanical Switch

Voice call 1984. A touch tone phone with battery in the central office on a mechanical switch would push 7 digits for the number of the person you wanted to call. The central office sends ring current to ring bells in the touch tone phone. When answered, the central office provides DC current to both parties. When one of them spoke, current is sent to the phone on the other end. The ear piece converts the current into analog voice where the ear could hear it.

Touch Tone Phone, Copper Wire and Digital Switch

Voice call 1994. A touch tone phone with battery in central office on a digital switch would push 7 digits for the number of the person you wanted to call. The central office sends ring current to ring bells in the touch tone phone. When answered, the central office provides DC current to both parties. When one of them spoke, the analog mouth piece converts it to current and current is sent to the digital switch in the central office. It is converted to digital 1's and 0's and connected to the circuit going to the phone line when answered. It then is converted from 1's and 0's to current on the line electrically and connected to wires going to the other party's touch tone phone, where the ear piece converts the electrical into analog voice where the ear could hear it.

Touch Tone Phone, Fiber Optic and Digital Switch

Voice call 2014. A touch tone phone with battery in optical network terminal (ONT) on fiber at the side of a home would push 7 digits to the number of the person you want to call. The touch tone phone converts it to electrical tones. The central office sends ring indicator to the ONT at the destination, where the battery in the ONT ring bells in the touch tone phone. When one of the persons spoke into the mouth piece, it converts analog sound into current. It is then sent to the ONT at their home, where it is converted to IP in the form of SIP and sent to the central office over the fiber Then it is connected to the digital circuit going to the fiber transport going to the ONT, where it is then converted from SIP to current and sent to the ear piece where it is converted from electrical to analog voice where the ear could hear it.

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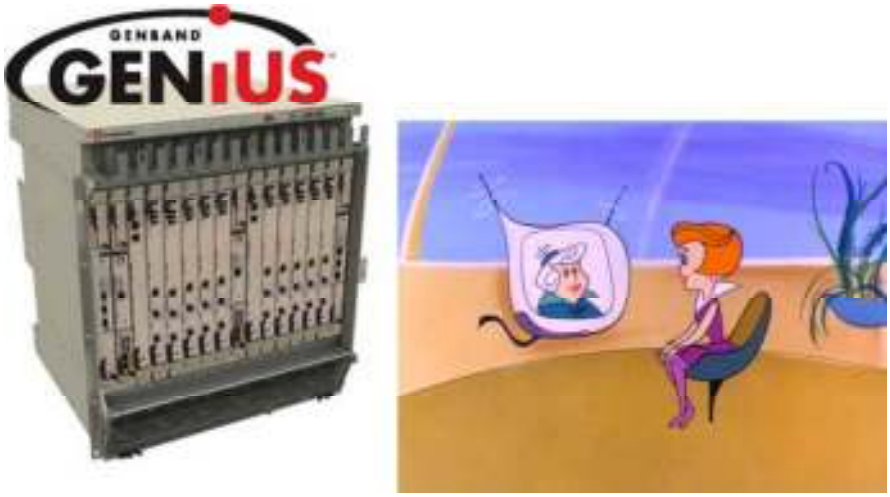
Video Phone, Fiber Optic and Soft Switch



Voice call 2024. A video phone connected to power in a home with battery in optical network terminal (ONT) on fiber at the side of a home It will ask for name and it dials 7 digits to the number of the person you want to call. The central office sends an indicator to the ONT, where the battery on the side of the other home activates music notification on video phone/TV. When one of the parties spoke into the microphone it is converted to current. Then it is converted to IP and added to the video from the device camera that has been converted to IP as well and sent over Ethernet to the ONT, where it is sent over the fiber to the photonic switch, where it is sent over another fiber to the ONT where you called, then it is sent from the ONT by Ethernet to the video phone/TV where the video is converted to viewable picture and voice is converted to current and sent to the stereo system where the speaker converts it to analog voice where the ear could hear it.

WIRELESS

Bag Phone and Wireless Hop

Voice calls wireless 1987. A call from a bag phone goes to another bag phone in the same area. It dials 7 digits, transmits to tower with most signal, and then sent to Mobile Telephone Switching Office (MTSO) over microwave or T-carrier transport. It is sent back out the same transport back to the tower where the called number has been registered to a tower to be served with the most signal. When one of the people speaks into the mouth piece, it is converted to electrical signal, then the bag phone converts it to radio frequency (RF) signal as analog signal and sends it to the tower. When the other bag phone is answered, the bag phone then converts the analog RF signal to electrical and the ear piece converts it to analog voice in their ear where the ear could hear it.

IPhone and T-Carrier

Voice call wireless 2007. A call from an IPhone goes to a Motorola Q. It dials 10 digits, transmits to tower with most signal, and then sent to Mobile Telephone Switching Office (MTSO) over microwave or T-carrier transport. It is sent back out the same transport back to the tower where the called number has been registered to be served with the most signal. When one of the people speaks into the mouth piece, it is converted to electrical signal, then the IPhone converts it to RF digital signal and sends it to

the tower. When the Motorola Q is answered, it then converts the RF digital signal to electrical and the ear piece converts it to analog voice in their ear where the ear could hear it.

IPhone and Ethernet Pipe

Voice call wireless 2010. A call from an IPhone in home area goes to a Motorola Q that is roaming away from home serving area. It dials 10 digits, transmits to tower with most signal, and then sent to Mobile Telephone Switching Office (MTSO) over Ethernet transport. The Motorola Q has registered as a roamer on a system by IS-41 messaging to tell the system where it is at any given time. A long distance call is placed to a roaming number of the switch that has registered the Motorola Q to a temporary number within that switch, then sent over microwave or T-carrier transport to the tower where the called number has been registered to be served with the most signal, the temporary number is released and the call is set up. When one of the people speaks into the mouth piece, it is converted to electrical signal, then the IPhone converts it to RF digital signal and sends it to the tower. When the Motorola Q is answered, the call transmits the voice from area to area, it then converts the RF digital signal to electrical and the ear piece converts it to analog voice in their ear where the ear could hear it.

IPhone 10 and IP Transport

Voice call wireless 2017. A call from iPhone 10 to Droid XXX. The caller says let me see Mom, IPhone 10 sends signaling notification over 5G in IP to the tower with best signal, camera converts picture to IP, microphone converts voice to IP to transmit. It is sent over Ethernet to wireless router/switch and sent back over Ethernet to the tower with the best signal strength of 5G to the Droid XXX where the phone converts video to screen and electrical to analog to the sound in the speaker where the ear could hear it.

VOIP OFF AND ON PSTN

Laptop and IP over Ethernet Internet on Net

Voice call over Skype IP with no number associated 2010. A caller with a laptop connected to public Internet has a camera and external microphone. The caller logs into Skype service and sees other person is on-line, then clicks to connect. Skype server connects originators IP address to the other persons IP address, computer converts video into IP, computer converts analog voice into IP and transmits in 1's and 0's of both video and voice to the other party that travels the internet network of Ethernet,T-1's or wireless transport to routers that determine path to end router and IP addressing of location of other party , at their end of the internet service connection, the computer converts IP to video on screen, sound to electrical then to analog to the speaker where the ear could hear it.

Laptop and IP over Ethernet Off Net

Voice call over Skype with phone number associated 2010. A caller with a laptop logs into Skype and dials 10 digit number of the other person. The computer with an external microphone converts voice from analog to IP then the computer sends digits in IP to server at Skype over broadband connection of DSL, FTTP or 4G. It then dials 10 digit telephone number and over interconnected landline trunks and is routed over transport trunks to the central office serving that phone number of the called person, and is switched to the connection that goes to the home or business, via FTTP, copper or wireless voice tower serving the person. The phone converts the technology used above of the voice from how it was transmitted to electrical, the ear piece converts it to analog sound in the ear piece where the ear could hear it.

SHORT MESSAGE SERVICE (SMS) OR TEXTING IN HOME AREA

Star Tac Phone and Signaling Channel

Text from a standard basic cell phone to another cell phone 2002. A person selects texting in a menu. They then enter the 10 digit cell phone number(s) or name(s) from a contact list to receive the text. They then type the text into the message portion of the message, and hit send. The phone converts the

message into 1's and 0's for transmission over the analog RF signal. The message travels over the signaling portion of the voice side of wireless in the messaging portion of the analog RF signal to the tower, the same as used to register with the tower for roaming and text delivery. It is then transmitted from the tower via the T-1 or wireless backhaul to the wireless serving switch or MTSO. It is then sent out over IS-41 signaling trunks to a third party messaging provider, or to equipment owned by the wireless provider in this or another location for routing to the correct 10 digit cellular phone over the IS-41 messaging back to their messaging provider and delivered to the MTSO over the IS-41 signaling trunks and then over the signaling trunks in analog RF to the cellular phone where the phone converts it to a text message for notification and display on the screen. A reply back from that message is sent in reverse using the same elements of the network to return a message for notification and display.

Smart Phone and Signaling Channel

Text from a smart cell phone to another smart cell 2012. A person selects texting in a menu or cell phone APP. They then enter or speak the 10 digit cell phone number(s) or name(s) from a contact list to receive the text. They then type or speak the text into the message portion of the message, and hit send. The phone converts the message into 1's and 0's for transmission over the digital RF signal. The message then travels over the signaling portion of the voice side of wireless in the messaging portion of the digital RF signal to the tower. It is then transmitted from the tower via the fiber, T-1, or wireless backhaul to the wireless serving switch or MTSO. It is then sent out over IS-41 signaling trunks to a third party messaging provider, or to equipment owned by the wireless provider in this or another location for routing to the correct 10 digit cellular phone over the IS-41 messaging back to their messaging provider and delivered to the MTSO over the IS-41 signaling trunks and then over the signaling trunks in digital RF to the cellular phone where it converts it to a text message for notification and display on the screen of the smart cell phone. A reply back from that message is sent in reverse using the same elements of the network to return a message.

IPAD and IP over Ethernet or WiFi

Text from a device with a messaging APP such as IPad to a cell phone 2013. A person opens the third party Apple APP on the device that has been pre-associated with a 10 digit telephone number for sending and receiving of texts by the APP provider. They then enter or speak the 10 digit cell phone number(s) or name(s) from a contact list to receive the text. They then type or speak the text into the message portion of the message, and hit send. The phone converts the message into 1's and 0's for transmission over the 4G data RF signal or a broadband WiFi network.. In 4G, the message then travels over the signaling portion of the data network of wireless over the 4G signal to the tower. It is then transmitted from the tower via the fiber, T-1, or wireless backhaul to the wireless serving data router in the MTSO and over the IS-41 signaling network routed to the APP's SMS server. It is then sent out over IS-41 signaling trunks to a third party messaging provider, or to equipment owned by the wireless provider in this or another location for routing to the correct 10 digit cellular phone over the IS-41 messaging back to their messaging provider and delivered to the MTSO over the IS-41 signaling trunks and then over the signaling trunks in digital RF to the cellular phone where it converts it to a text message for notification and display on the screen. A reply back is sent to the equipment of the wireless company over digital 4G to the tower, back over transport to the MTSO and to the message equipment, over IS-41 signaling trunks to the SMS server of the APP and back over the 4G data network or broadband WiFi network to the IPad for notification or display.

SATELLITE

Touch Tone Phone and Satellite Receiver/Transmitter

Voice call over satellite 2015 from touch tone phone to another touch tone phone on FTTP. A caller with satellite data service dials 10 digit number of another person. The digital receiver of the satellite converts tones to IP and transmits it from a dish on the side of a home to a satellite 22,300 miles from earth. The satellite then transmits IP back to earth to a receiving base station where it goes to an IP switch and is routed and then dials 10 digit telephone number and over interconnected landline trunks and is routed over transport trunks to the central office serving that phone number of the called person, and is switched to the connection that goes to the home or business, via FTTP, copper or wireless voice tower serving the person. Analog voice from the mouth piece is converted to electrical, sent to the digital receiver and converted to IP. The dish transmits IP over RF to the satellite in the sky, then back down to the base station dish in RF and converts it to 1's and 0's over the interconnected circuit to the customer as described above. The phone converts from how it was transmitted to electrical, the ear piece converts it to analog sound in the ear piece.