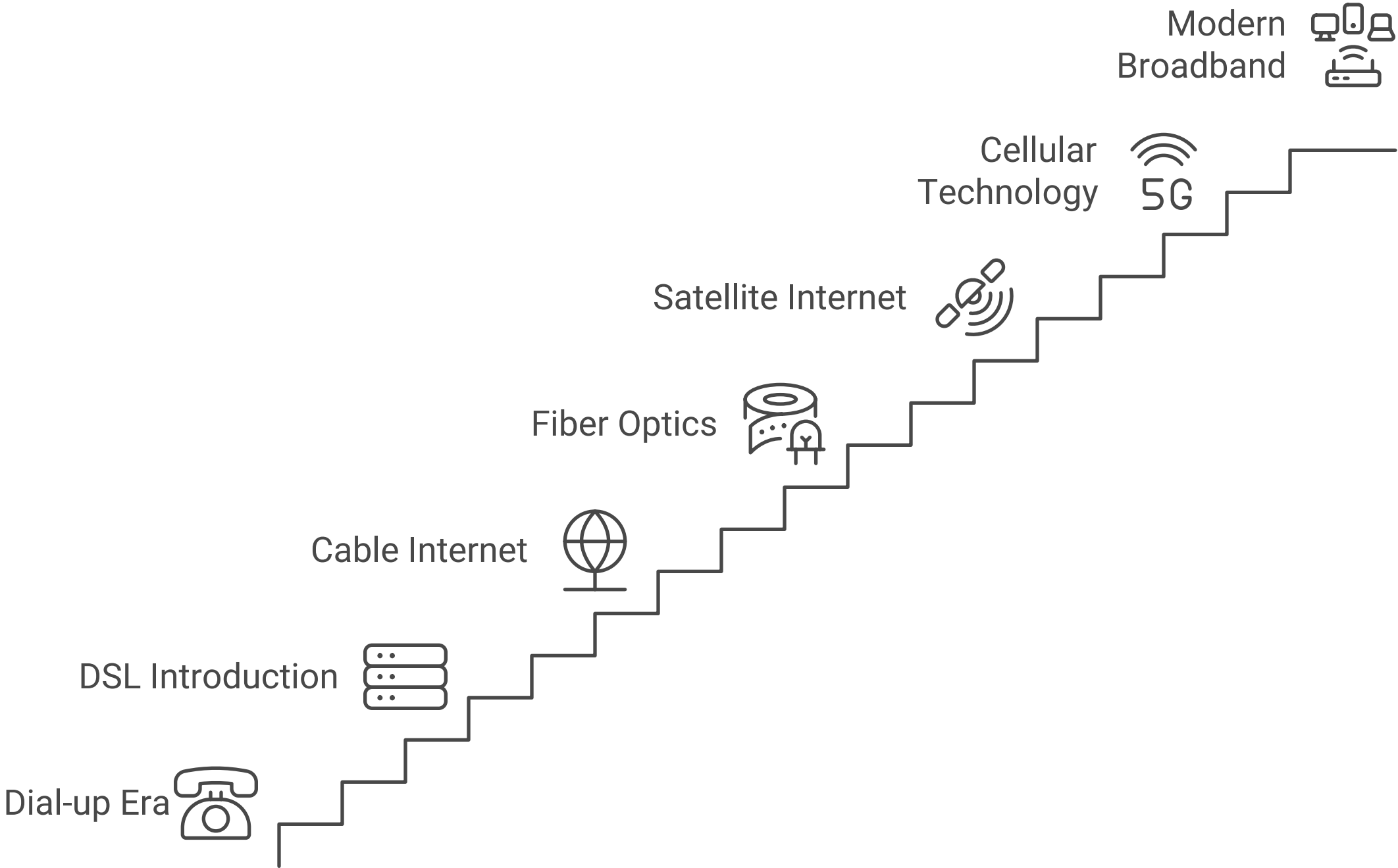


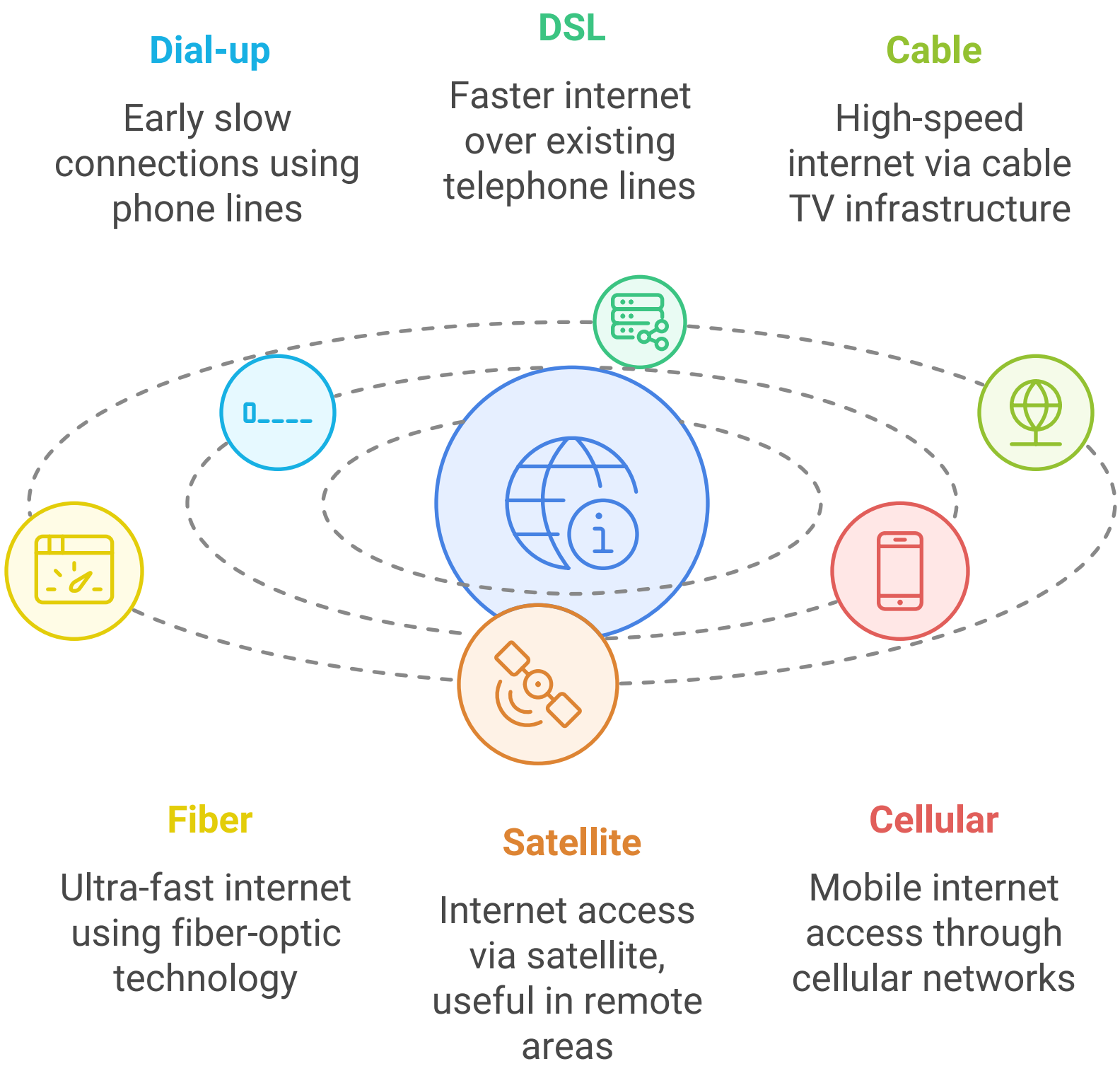
Internet Connection Types

This document explores the evolution of internet connection types, focusing on the transition from dial-up connections in the 1990s to modern broadband technologies. It highlights the various methods of internet delivery, including DSL, cable, fiber, satellite, and cellular connections, while emphasizing their unique characteristics, advantages, and limitations. The aim is to provide a comprehensive overview of how internet connectivity has transformed over the years, catering to the growing demands for speed and reliability.

Evolution of Internet Connectivity



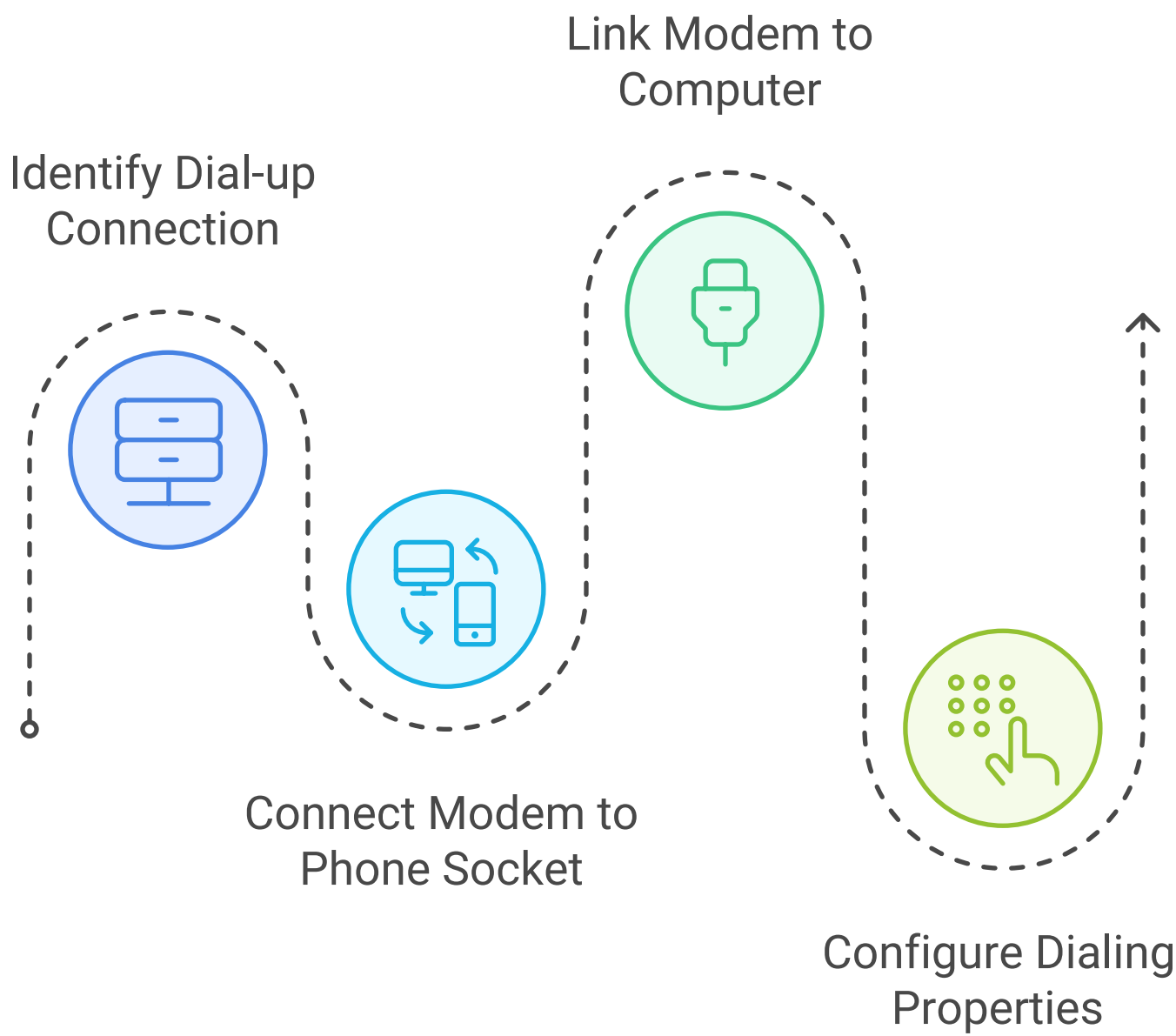
Overview of Internet Connectivity



Dial-up Connections in the 1990s

Dial-up connections were the primary means of accessing the internet in the 1990s. These connections were notably slow compared to modern standards and required a modem (either internal or external) connected via an RJ-11 phone socket. Configuration involved linking the modem to a computer’s COM port with the appropriate local dialing properties.

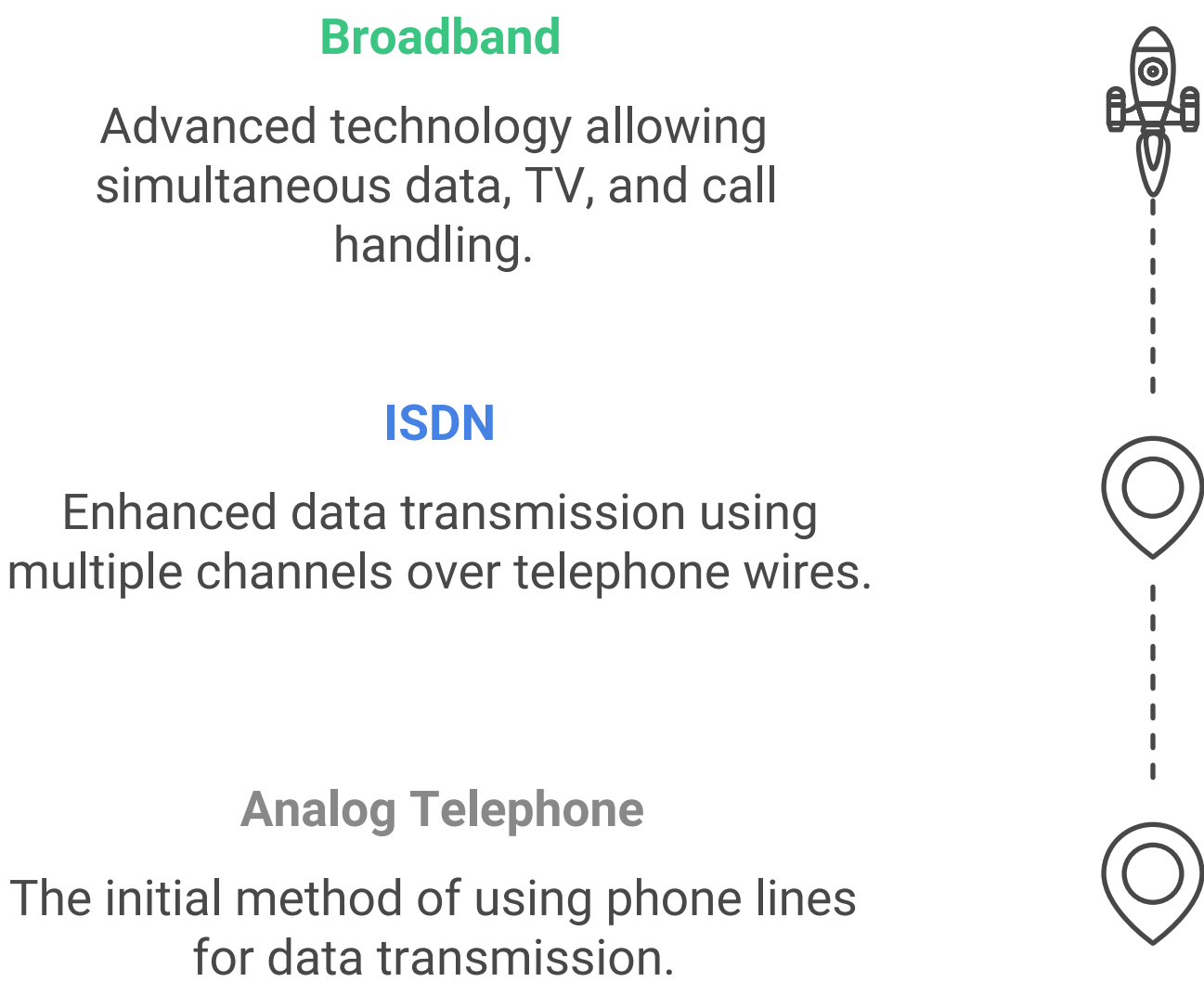
Dial-up Internet Connection Process



Transition from Analog Telephone to Broadband

- **Analog Telephone (Dial-up):** Utilized phone lines for data transmission by making a call to a remote modem.
- **Integrated Services Digital Network (ISDN):** Improved upon dial-up by using multiple channels for sending diverse data (voice, video) over telephone wires.
- **Broadband:** Utilizes varying frequencies to handle multiple signals on the same medium (e.g., cable TV coaxial cables). This includes various connections such as cable, DSL, ISDN, satellite, and cellular, allowing simultaneous data and TV/call handling.

Evolution of Internet Connection Technologies



⋮ Examples

Broadband ensures that household internet doesn’t interfere with TV services, as they share coaxial cables. Cell phones exemplify broadband utility, handling voice and internet concurrently.

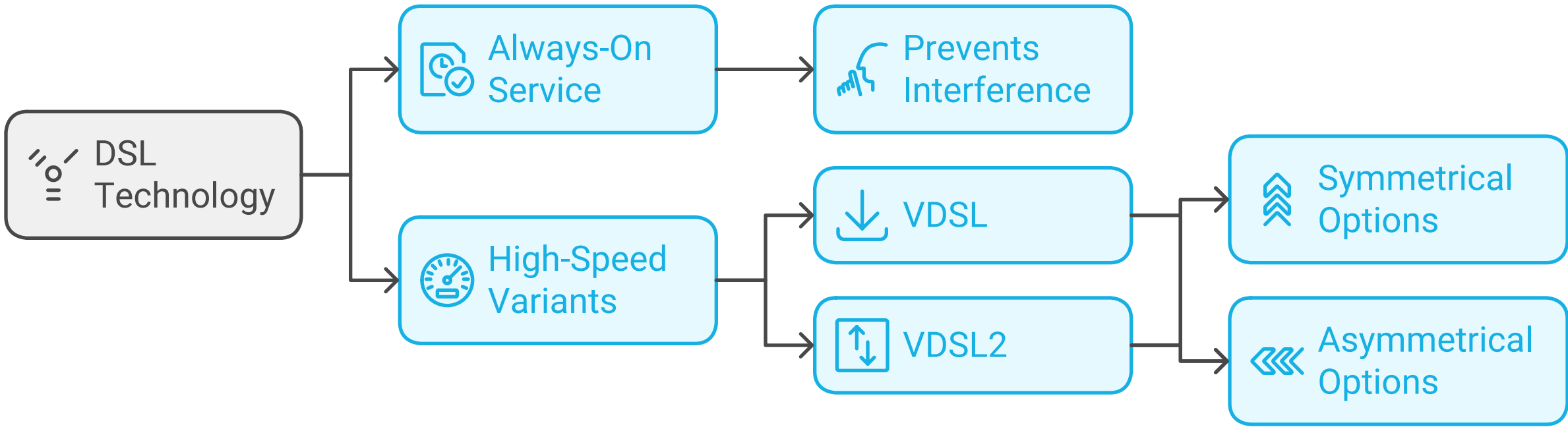
Recap of Key Points

- The evolution from dial-up to broadband represents a substantial increase in speed and data-handling capability.
- ISDN and broadband allow for concurrent service delivery across multiple channels and frequencies.

DSL, Cable, and Fiber

DSL (Digital Subscriber Line)

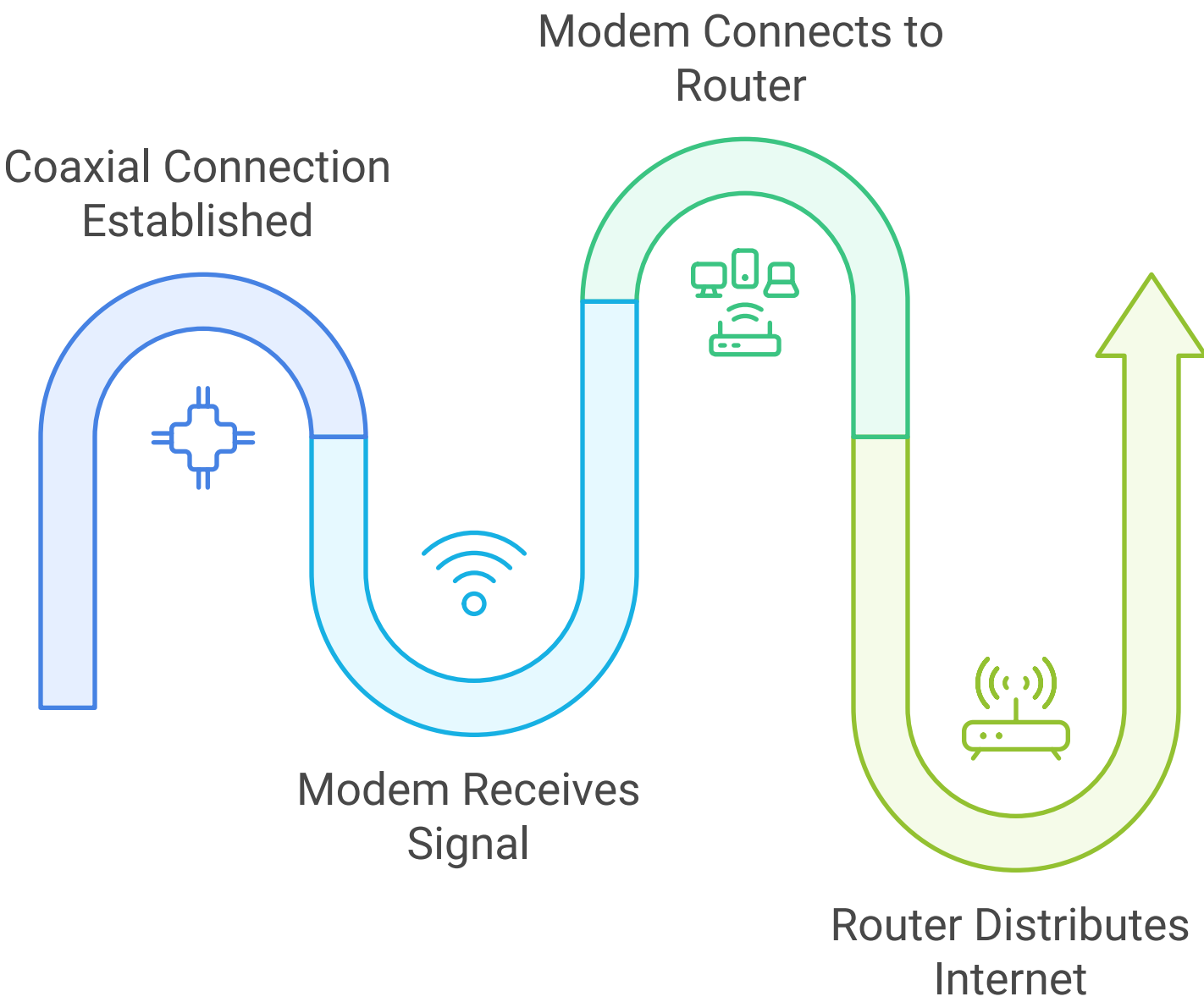
- **Always-On Service:** Unlike older systems, DSL does not require redialing. It separates frequencies for voice and data, preventing interference.
- **High-Speed Variants:** VDSL and VDSL2 provide increased speeds with both symmetrical and asymmetrical options.



Cable

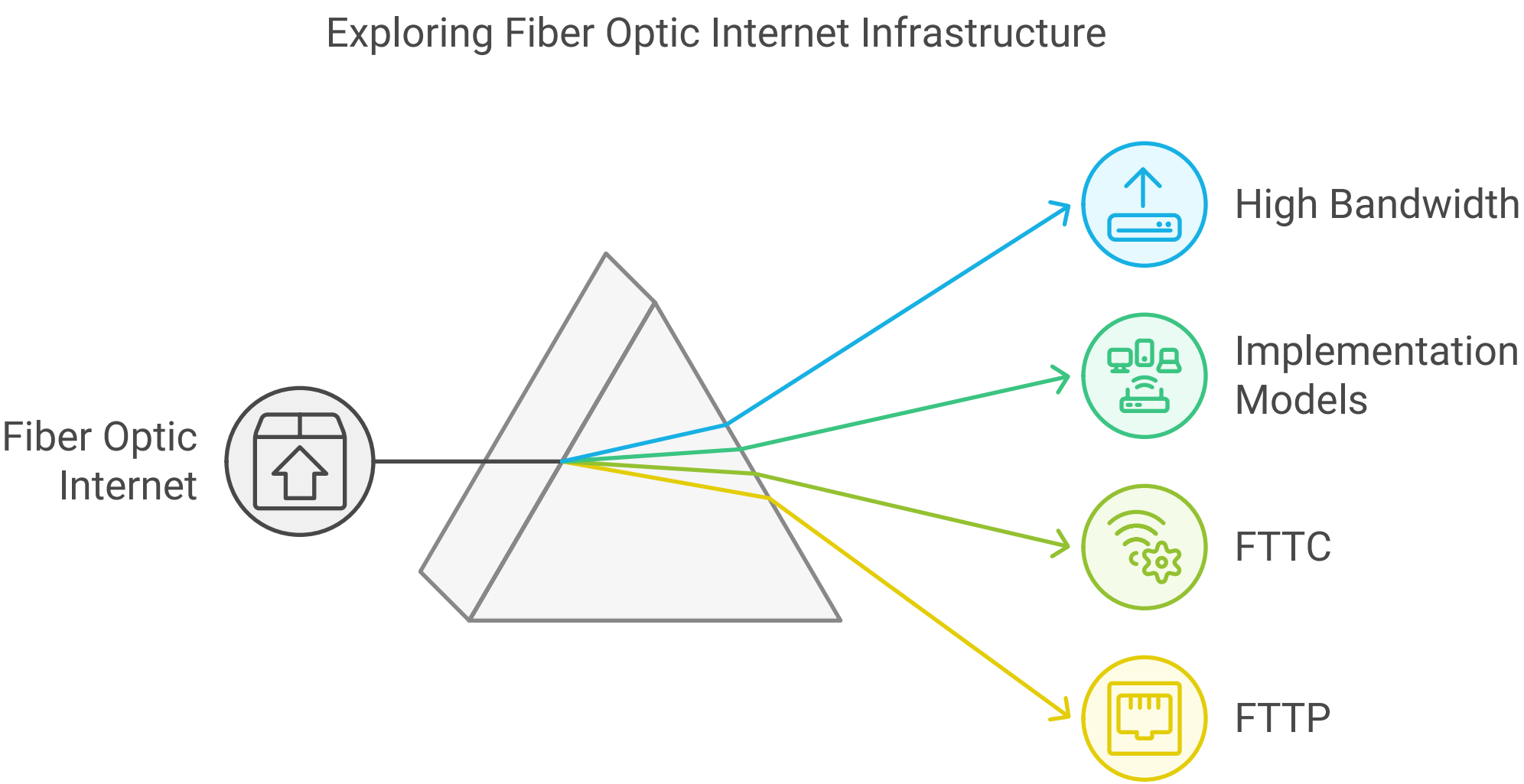
- **Coaxial Connection:** Utilizes existing TV infrastructure to deliver internet without the need for phone lines.
- **Setup:** Cable modems connect directly or share through a router for multiple devices.

Cable Internet Setup Process



Fiber

- **High Bandwidth:** Uses light transmission for vast data capacities, forming the backbone of major internet networks.
- **Implementation Models:** Includes FTTC (Fiber to the Curb) and FTTP (Fiber to the Premises), improving last-mile connectivity via hybrid setups or direct fiber.



Examples

VDSL2 can support rapid data transfer for tasks like video conferencing, representing a significant increase over traditional DSL. FTTP ensures high-speed internet directly to a building, making it ideal for businesses that demand reliable, fast connections.

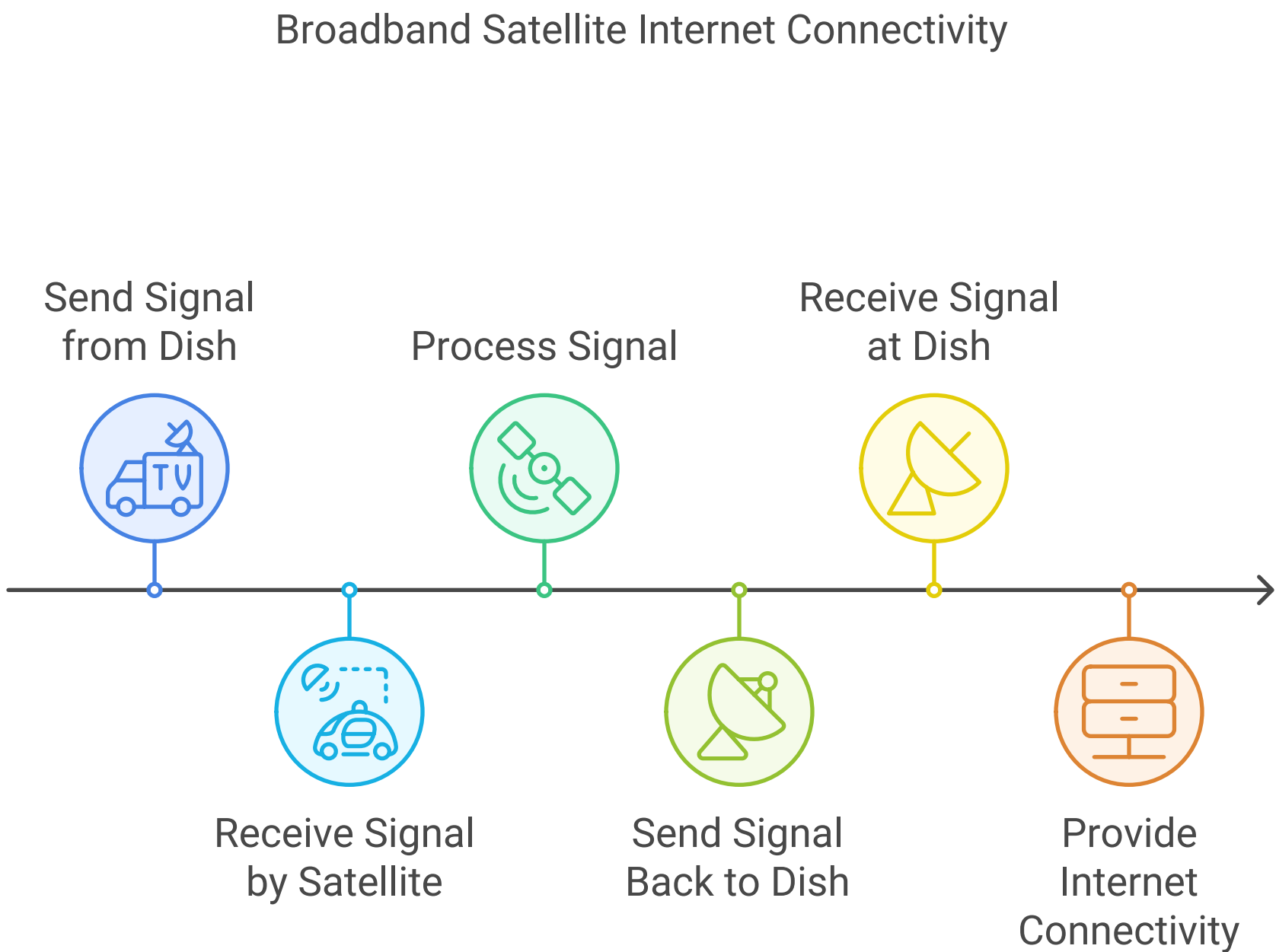
Recap of Key Points

- DSL, cable, and fiber represent distinct methods for delivering internet connectivity, each with unique configurations and capacities.
- Fiber's role in backbone networks highlights its critical importance to modern digital infrastructure.

Satellite

Broadband Satellite Internet

Broadband satellite internet uses satellite dishes to send and receive signals to orbiting satellites, providing connectivity without relying on terrestrial cables.



- **Speed and Latency:** Offers download speeds up to 10Mb/s, with significantly lower upload speeds. High latency can impact time-sensitive activities like gaming and VoIP.
- **Advanced Satellite Services (LEO):** New Low Earth Orbit (LEO) satellite services can support speeds up to 100Mbps and feature improved latency (100-200ms), enhancing user experience through better alignment via motorized dishes.

Example

In remote locations lacking DSL or cable infrastructure, satellite internet serves as a viable alternative despite its latency drawbacks for certain applications.

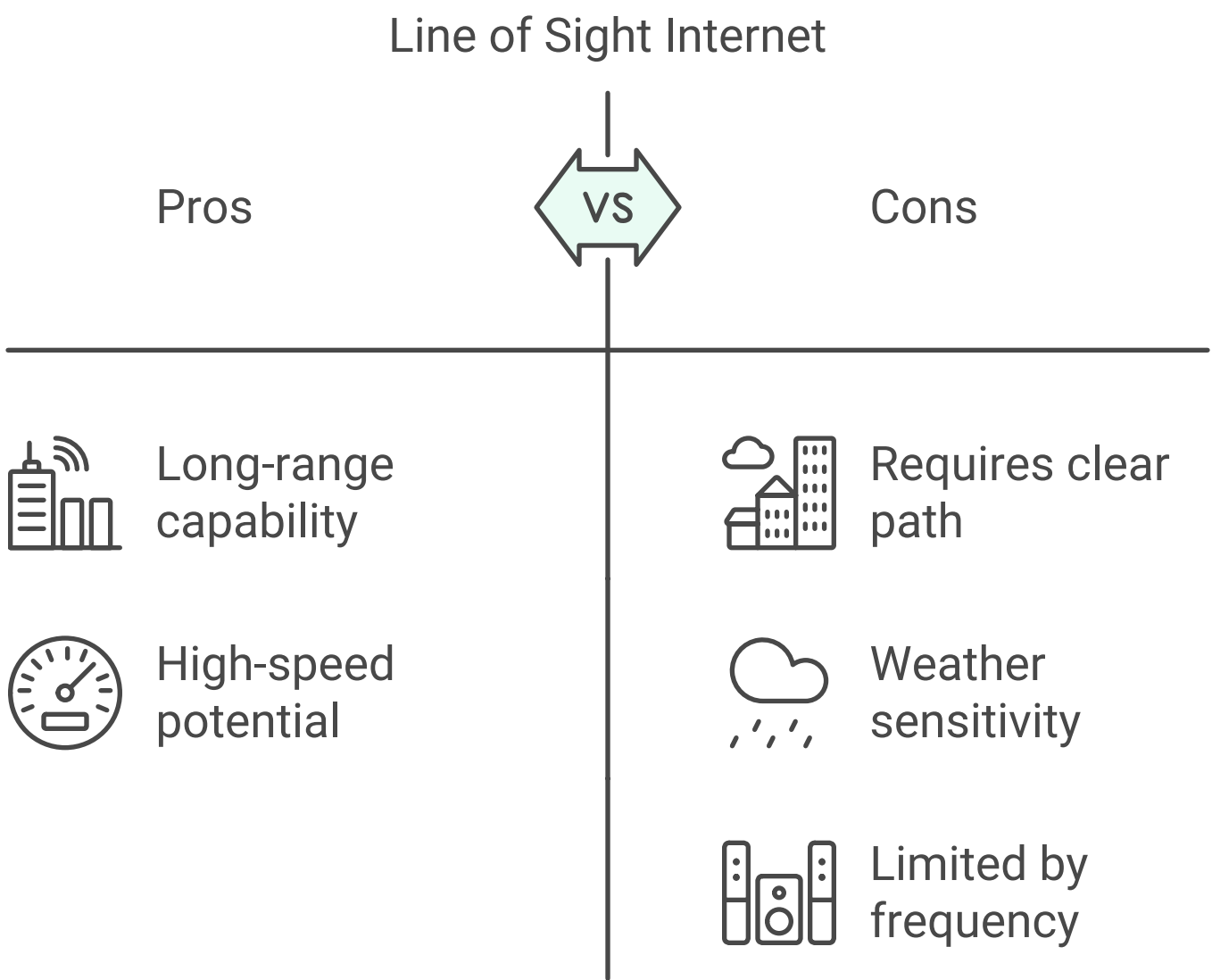
Recap of Key Points

- Satellites provide internet access where traditional methods fail, using dishes for two-way communication.
- Standard satellites have high latency, making them suitable for general use but not for immediate-response activities.
- LEO satellites improve latency and speed, enhancing the overall user experience.



Line of Sight Wireless Internet Service

- **Line of Sight Internet:** Utilizes radio signals transmitted from towers to receivers. Requires an unobstructed path for optimal performance.
- **Signal Range & Frequency:** Lower frequencies (900 MHz) can travel further (up to 40 miles), while higher frequencies (5.7 GHz) are limited to shorter distances (2 miles).
- **Obstacles Impacting Signals:** Objects like trees, buildings, and poor weather can weaken signals and interfere with connectivity, necessitating clear pathways.



Example:

- In rural areas with little interference, line of sight services can efficiently reach far distances due to fewer obstructions and lower frequency usage.

Recap of Key Points:

- Essential for line of sight internet: maintaining a clear path for signal transmission.
- Frequency impacts travel distance; lower frequencies travel farther.
- Natural and man-made obstacles affect signal strength and efficiency.



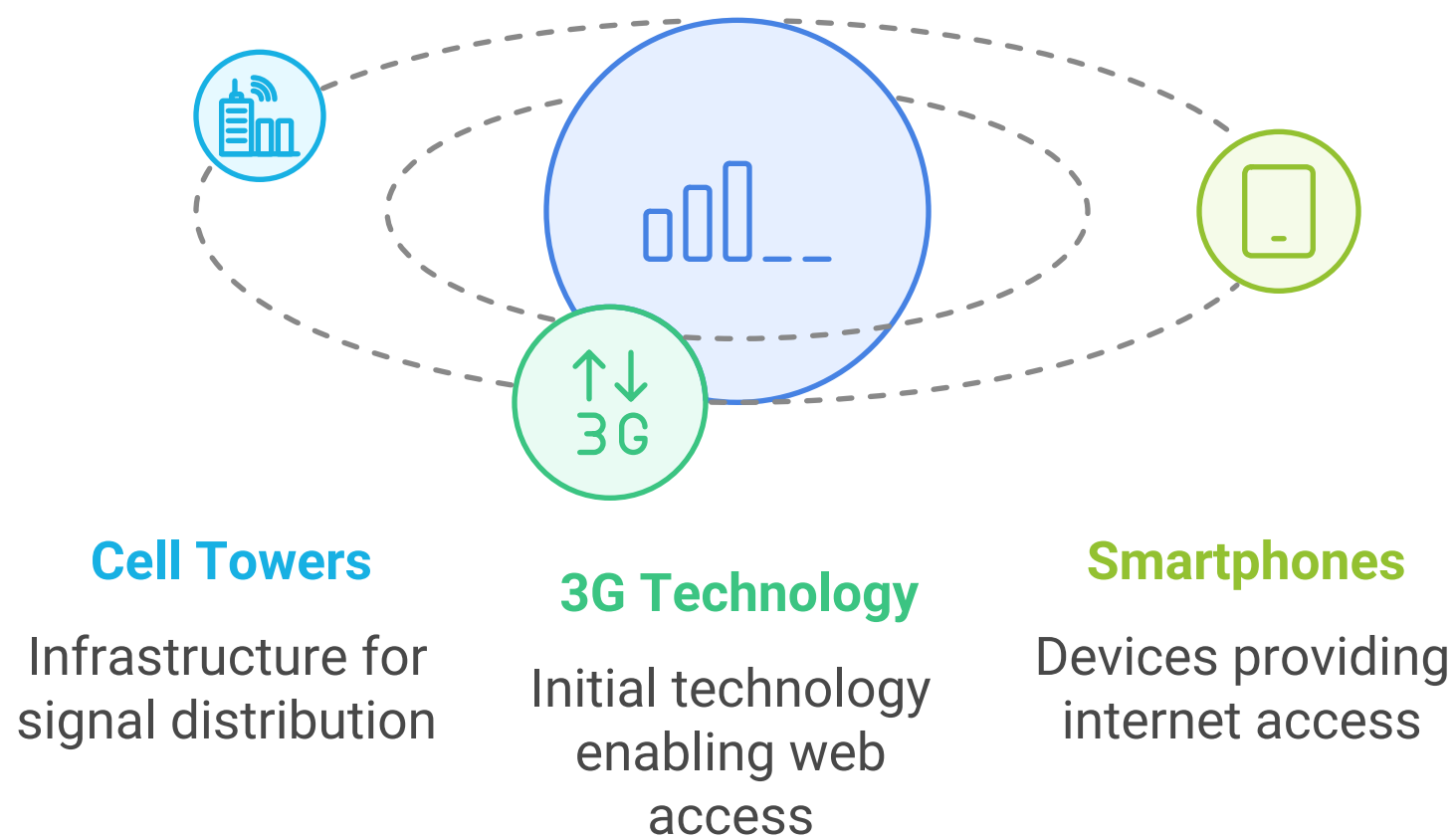
Cellular



Cellular Internet Technology

Cellular internet technology utilizes widespread cell towers to offer internet access, beginning with 3G technology that enabled smartphones to surf the web.

Components of Cellular Internet Technology



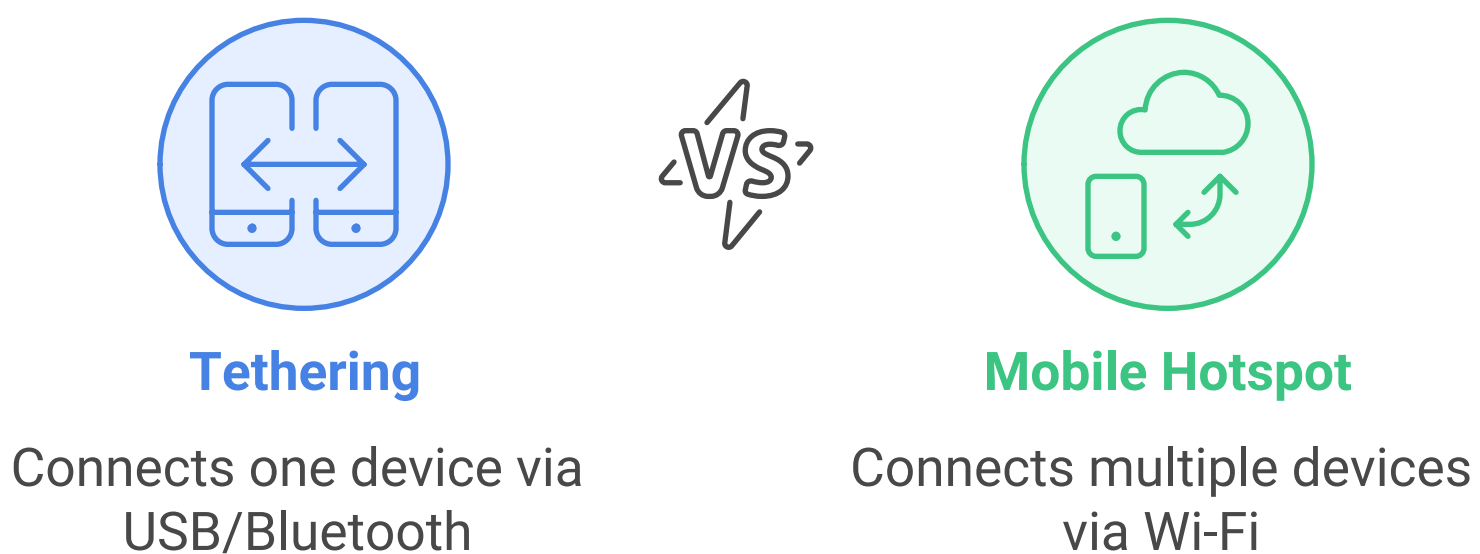
- **Speed Improvements:** Each new generation of cellular technology boosts download and upload capabilities.
- **Primary Internet Access:** In some locales, smartphones serve as the sole source of internet access; a considerable number of Americans also depend on cellular networks for their internet needs.



Mobile Hotspot and Tethering

- **Tethering and Hotspot Services:** Tethering links another device to a smartphone through Wi-Fi, Bluetooth, or USB, sharing its internet connection.
- **Mobile Hotspot:** Functions similarly, allowing multiple Wi-Fi devices to access the internet through a single smartphone, facilitating connectivity in non-fixed locations.

Choose the best method for sharing mobile internet



Example:

- Travelers or remote workers can use their smartphone as a mobile hotspot to connect a laptop and access the internet while on the move.

Recap of Key Points:

- Tethering and hotspots convert smartphones into portable internet routers.
- Simple connectivity using Wi-Fi, Bluetooth, or USB supports internet access for multiple devices.

Conclusion

The landscape of internet connectivity has evolved dramatically from the days of dial-up to the diverse array of broadband options available today. Each connection type offers unique advantages and caters to different user needs, highlighting the importance of understanding these technologies in our increasingly digital world.

