

## Gilat Blog

### The Importance of Multi-Topology SCPC Modems in Satellite Communications

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Satellite communications have revolutionized global connectivity, enabling seamless communication across vast distances and hard-to-reach terrain. SCPC modems are a unique solution in satellite communications, enabling point-to-point connections that have become increasingly essential due to their ability to offer dedicated bandwidth, low latency, and high reliability. These modems are particularly valuable in scenarios where consistent performance and quality of service are paramount. Their unique capabilities make them indispensable for supporting a wide range of applications, from enterprise connectivity and broadcast services to high-throughput data transfer and real-time communications.

#### Understanding SCPC Modems

SCPC modems offer a point-to-point connection in a hub-less environment where each modem implements full receive and transmit capabilities over dedicated bandwidth. This differentiates SCPC modems from other types of modems, such as Time Division Multiple Access (TDMA) modems, which combine multiple channels into a single carrier. The dedicated point-to-point nature of SCPC modems provides several technical and operational benefits, making them particularly valuable for applications that require constant connection and high throughput such as cruise ships, backhauling, and government.

#### Differences Between SCPC and Other Modems

Over the years Gilat has focused on TDMA-based modems due to the market need for bandwidth sharing for vast applications like enterprise and 3G/4G cellular backhauling. But as the need for throughput has increased and the desire to be connected anywhere with high throughput/low jitter became a bare necessity, we at Gilat understood the need for a high throughput, multi-orbit SCPC Modem to provide the best experience for high-end applications.

**As such, we recently announced the addition of an SCPC modem to our SkyEdge IV Aquarius Pro, offering:**

**Efficient Dedicated Bandwidth Usage:** utilizes DVB-S2X waveform with high modcod usage up to 250Msps carrier to achieve the best efficiency and ensure consistent performance and quality of service.

**Low Latency:** optimizes the advanced SkyEdge IV quality of service and queueing mechanism to minimize latency since there is no need for multiplexing and demultiplexing processes. This is critical for real-time applications like voice and video communications.

**Scalability and Flexibility:** offers scalable solutions that can be easily adjusted to meet changing bandwidth requirements, without impacting other channels.

**Enhanced Security:** combining the basic operation mode of SCPC based on the separation of channels reduces the risk of cross-channel interference and eavesdropping. In addition, the advanced SkyEdge IV platform and Aquarius Pro's built-in security mechanism create an enhanced, secured point-to-point solution.

#### Importance of Supporting Different Topologies

The ability to support various network topologies is essential for meeting the diverse needs of satellite communications users. Two topologies where the SkyEdge IV Aquarius Pro SCPC modem excels are star and point-to-point configurations; using Software Defined Radio capabilities the Aquarius Pro can operate as a point-to-point modem or a Star topology modem (as part of a SkyEdge IV network).

##### Star Topology:

In a star topology, multiple remote nodes are connected to a central hub. SCPC modems are ideal for this setup because they provide dedicated links between the hub and each remote node. This ensures reliable and high-quality communication, crucial for applications like enterprise connectivity, where remote offices need consistent and uninterrupted access to central resources.

##### Point-to-Point Topology:

Point-to-point topology involves a direct communication link between two locations. SCPC modems are particularly well-suited for this configuration as they offer dedicated bandwidth and low latency, ensuring optimal performance for high-throughput applications like video conferencing, data transfer, and broadcast services.

### Gilat's SkyEdge IV Aquarius Pro Modem with Advanced SCPC Capabilities

The SkyEdge IV Aquarius Pro with SCPC capabilities is a state-of-the-art solution designed to meet the demands of modern satellite communications. This modem is packed with advanced features that make it a standout choice for various applications. Here are the key benefits:

##### Software-Defined Modem:

The SkyEdge IV Aquarius Pro with SCPC mode is a versatile, software-defined modem capable of operating in either star or point-to-point topologies. This flexibility allows it to adapt to different network configurations and requirements with ease.

##### Ultra-High Throughput:

Designed for ultra-high throughput trunks up to 750Mbps per direction, the SkyEdge IV Aquarius Pro with SCPC mode is ideal for applications such as broadband, 4G and 5G backhauling, commercial maritime and cruise ships, and corporate enterprise services. This high capacity ensures that even the most bandwidth-intensive applications are supported efficiently.

##### Multi-Orbit Support:

The SkyEdge IV Aquarius Pro with SCPC mode supports multi-orbit GEO and NGSO satellites with seamless 'Make-Before-Break' satellite switching. This capability ensures uninterrupted service and seamless transitions between satellites, providing consistent and reliable connectivity.

##### Integrated MEF-Based Services:

The SkyEdge IV Aquarius Pro with SCPC mode integrates MEF-based Layer-2 and Layer-3 services, offering advanced networking capabilities. This integration allows for enhanced network performance and management, catering to sophisticated enterprise requirements.

##### S2X Air Interface:

Equipped with the S2X air interface, the SkyEdge IV Aquarius Pro with SCPC mode ensures maximum spectral efficiency and the highest terminal availability. This feature optimizes bandwidth usage and enhances the overall performance of satellite communication links.

##### Flexible Management:

The SkyEdge IV Aquarius Pro with SCPC mode offers flexible management options, allowing for independent control with local management capabilities or central user management. This flexibility ensures that network operators can choose the management approach that best fits their operational needs.

##### Unique RF Combining Technology:

The unique RF combining capability of the SkyEdge IV Aquarius Pro with SCPC mode enables higher reception levels over existing terminal antennas, enhancing signal quality by up to 3dB. This innovation allows the use of smaller antennas while achieving the same performance levels as a single large antenna, making it ideal for high-performance deployments constrained by antenna size, especially in challenging environments.

### Conclusion

SCPC modems are integral to the success of satellite communications, offering dedicated bandwidth, low latency, scalability, and enhanced security. Their ability to support star and point-to-point topologies makes them indispensable for various applications, from enterprise connectivity to broadcast services. Gilat's SkyEdge IV Aquarius Pro with SCPC mode, with its array of advanced features, represents the pinnacle of SCPC technology. Its software-defined flexibility, ultra-high throughput capabilities, multi-orbit support, integrated MEF-based services, S2X air interface, and unique RF combining technology ensure enhanced efficiency, reliability, and cost-effectiveness. As satellite communications continue to evolve, the importance of robust and flexible SCPC modems like the SkyEdge IV Aquarius Pro will only grow, ensuring seamless and high-quality connectivity across the globe.

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