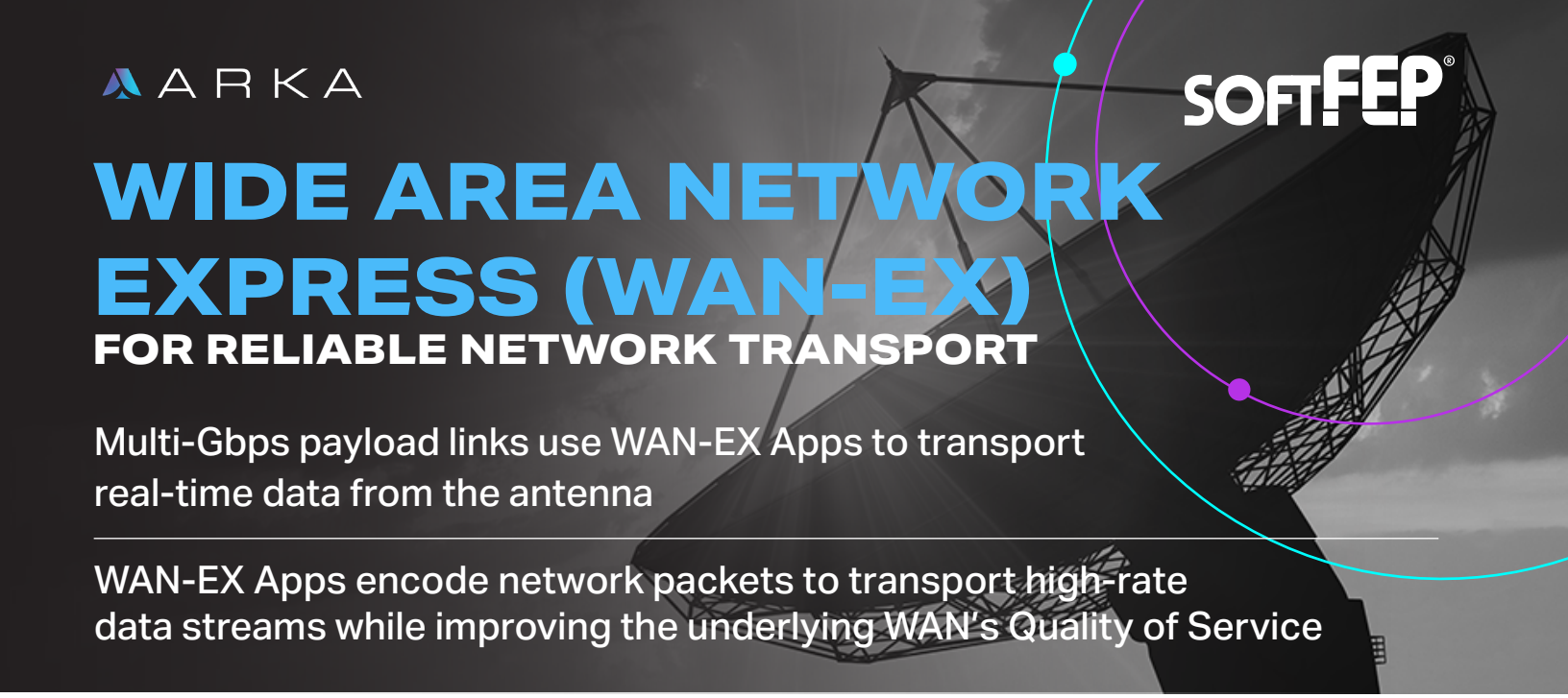


ARKA

SOFTFEP®

WIDE AREA NETWORK EXPRESS (WAN-EX)

FOR RELIABLE NETWORK TRANSPORT

Multi-Gbps payload links use WAN-EX Apps to transport real-time data from the antenna

WAN-EX Apps encode network packets to transport high-rate data streams while improving the underlying WAN's Quality of Service

WAN-EX FEATURES

DATA DELIVERY TO CLOUD PROCESSING:

Wide Area Network Express (WAN-EX) Apps by ARKA enables high data rate pipes in and out of cloud processing architectures, providing assured network transport of large volumes of time-sensitive data over a wide area network for near real-time processing.

RELIABLE DATA TRANSPORT:

To enable assured network transport, data streams flowing through WAN-EX are encoded along with sequence counters and other flags that are added to each network packet to detect and recover missing or out of order network packets.

IMPROVED QUALITY OF SERVICE:

WANs with the capacity to transport multi-Gbps of continuous data are costly, particularly if one or more of the end points are geographically remote from major urban areas. Purchasing this capacity with a high Quality of Service (QoS) (low packet loss) only adds to the price. ARKA's WAN-EX Apps improve on the inherent WAN QoS without the need for network retransmission. They may enable customers to purchase their WAN with a less-expensive QoS.

DETERMINISTIC LATENCY:

WAN-EX Apps allow users to define a desired edge-to-edge network delay across the wide area network (WAN) so that data is continuously delivered with a fixed latency.

WAN FORWARD ERROR CORRECTION:

Even with a WAN QoS at 99.95%, transport of a 10 Gbps data stream results in tens of thousands of packets being lost over a 10-minute contact. With built-in forward error correction, WAN-EX Apps overcome packet loss without costly transmission of data packets. These Apps significantly improve data delivery of multi-Gbps data streams-date moves across a WAN in real time with no "gaps" in the streams. As a result, there is no window to catch up after network errors.

POINT-TO-POINT AND MULTICAST:

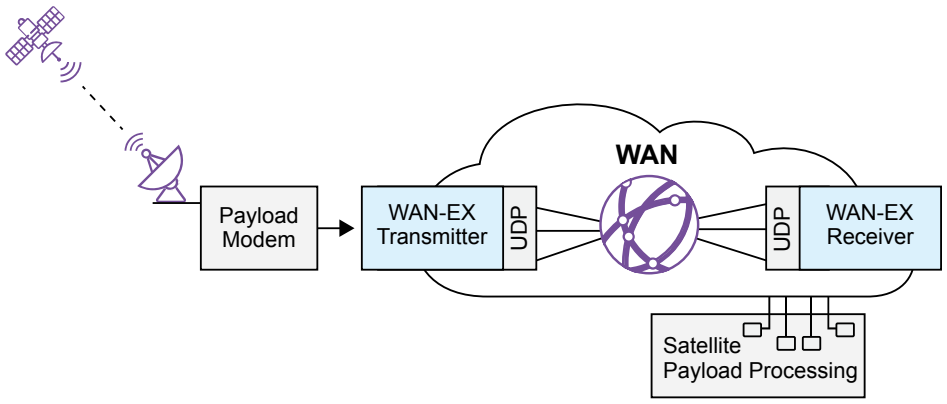
Data packets from a transmit location can be sent to one receiver or the data can be fanned out to multiple destinations, using point-to-point connections for each source-destination pair. The underlying WAN-EX algorithms work in tandem on both the sender and receiver end points.

WAN BANDWIDTH AGGREGATION:

WAN-EX supports splitting a high-rate data stream across multiple lower bandwidth WANs. Each link is individually encoded at the sender and decoded at the receiver, once it gets to the receiver, the composite data stream is re-aggregated. This capability is particularly useful in locations that may be only served by lower rate IP networks.

HOW IT WORKS

ARKA's WAN-EX software manages and improves reliable and assured network transport of continuous data streams across wide area networks, moving high-rate payload data from earth receipt to cloud processing.



Despite high network reliability, thousands of packets can be lost every minute in the network transport of multi-Gbps data streams, forcing either data gaps or costly retransmission.

High-rate, continuous data streams have no "gaps" in the data, meaning there's no window to catch up after network errors. In addition, there may not be any means to retransmit data packets in the event of network outage—the data is simply lost. These data streams present a challenge for traditional network protocols, such as TCP. While TCP provides benefits of guaranteed delivery, packet ordering, and packet loss recovery, with TCP, losses on the network can result in large variations in WAN latency as TCP implements its sliding windows to control network congestion. WAN-EX provides these benefits of TCP but with UDP and fixed latencies.

COMPARISON OF NETWORK PROTOCOLS FOR HIGH-RATE DATA STREAMS

WAN PERFORMANCE PARAMETER	TCP	UDP	UDP WITH WAN-EX
Guaranteed Delivery	Yes	No	Yes (other than outages)
Packet Ordering	Yes	No	Yes
Random Packet Loss Recovery	Yes (via retransmit)	No	Yes
Outage Recovery	Variable (can be lengthy)	No	Yes
Latency	Highly variable	Relatively fixed	Fixed
Tuning Required	Yes	No	Yes
Network Protocol Loading	~110% of data rate	~105% of data rate	< 115% of data rates > 5 Gbps < 120% of data rates > 1 Gbps

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