JOINT SOLUTION BRIEF

SSH NQX™ × CYSEC ARCA SATCOM

Quantum-safe satellite links. Maximized output. One solution.



SSH NQX™ provides certified, post-quantum Ethernet and IP encryption. CYSEC ARCA SATCOM adds a TLS 1.3 secure transport with a built-in performance-enhancing proxy that wins back the throughput encrypted tunnels lose on satellite links. Together they give defense, government and critical-infrastructure operators long-term confidentiality and full use of the capacity they pay for, over any orbit.

up to 83×
more throughput on a GEO link, with NQX encrypting all traffic[1]

12–314×
more throughput when the LEO link was jammed or flooded[1]

Hybrid PQC
ML-KEM (FIPS 203) and FrodoKEM, alongside classical algorithms

0
vendor-held keys: the operator owns every key on both layers

Four forces are reshaping secure satellite communications

01
Satellite traffic is easy to record
Anyone inside a beam footprint can capture the signal. Mission data that must stay secret for 10+ years is exposed today to "harvest now, decrypt later".

02
PQC deadlines are now set
The EU roadmap asks Member States to start moving to post-quantum crypto by end-2026 and protect high-risk use cases by end-2030.[2]

03
Satcom is going sovereign
GOVSATCOM went live in January 2026, IRIS² follows by 2030, and national LEO systems are being announced. Nations want to own the crypto and keys too.[3]

04
Encryption costs speed on satellite
Encrypted tunnels hide traffic from link optimizers. On high-latency links, standard TCP over a VPN leaves much of the paid capacity unused.

Each layer does one job well

SSH NQX™
Certified quantum-safe encryption

- Layer 2 Ethernet and Layer 3 IP encryption, side by side if needed
- Hybrid key exchange: ML-KEM and FrodoKEM with classical algorithms
- NCSA-FI approved up to TL III (EU Confidential); NATO and EU Restricted in process
- Crypto-agile: new algorithms by software update, no hardware swap

CYSEC ARCA SATCOM
Throughput on the satellite leg

- Performance-enhancing proxy (PEP) optimizes traffic before it enters the encrypted tunnel
- TLS 1.3 / QUIC-based secure transport, hybrid post-quantum ready
- Runs on GEO VSAT, LEO including Starlink, 5G, HF and Wi-Fi
- Qualified on a commercial GEO operator network; developed under ESA ARTES 4S

TOGETHER
Sovereign control, end to end

- Two independent encryption layers, each with operator-held keys
- One design over sovereign LEO, commercial LEO, MEO and GEO, and over 5G or fiber
- Site networks and applications stay unchanged
- European technology from Finland and Switzerland, available to qualify today

WHERE IT FITS

Deployed and remote units
Forward bases, field HQs and remote sites reaching command over LEO or GEO

Maritime and airborne
Vessels and platforms where satellite is the only link

Ground stations and teleports
Gateway and PoP links back to core and data centers

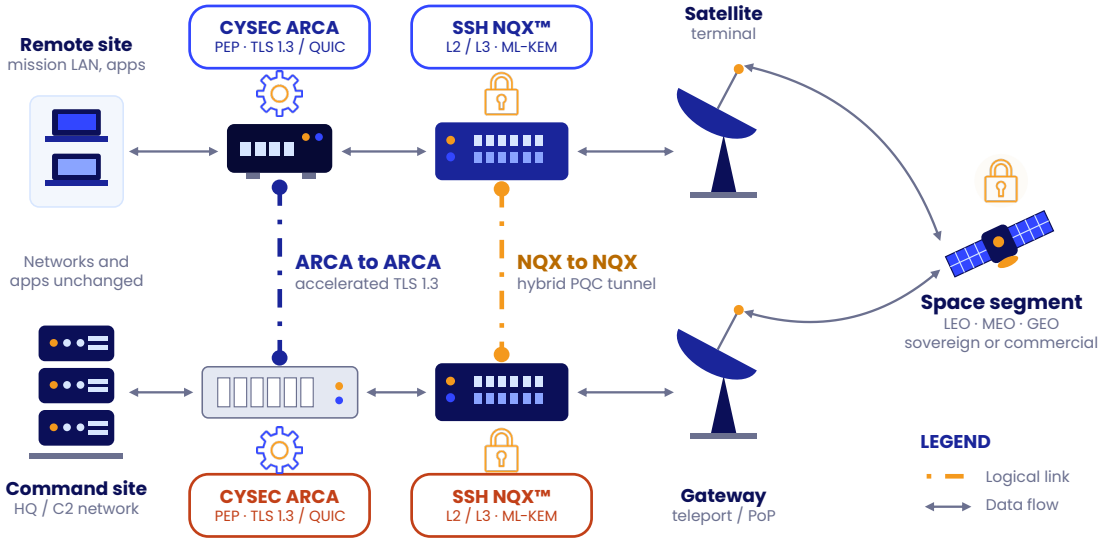
Resilient backup links
Satellite or 5G fallback for critical infrastructure when terrestrial networks fail

Qualify it on your own links
SSH and CYSEC run joint proofs of concept over the customer's own satellite bearers: one remote site and one gateway to start, scaling to multi-orbit networks.

HOW IT WORKS

Acceleration inside, certified encryption outside

ARCA SATCOM sits on the protected side of each NQX node. It optimizes traffic first, then NQX encrypts everything that leaves the site. NQX configuration and certification stay unchanged, and NQX is unaware the link is satellite, so the same design runs over 5G or terrestrial links.



Traffic is symmetric. Tunnel lines are logical; traffic physically crosses the space segment.

TEST RESULTS

Faster on every orbit, and resilient under attack

Scenario	No optimization (Mbps)	With optimization (Mbps)	Gain
LEO satellite (Starlink)	10.7–11.5	27.8	**~2.5×**
MEO satellite (0.05% loss)	3–4	50 (70 peak)	**~14×**
GEO satellite (250 ms, 0.1% loss)	0.3	25	**~83×**
LEO jamming (13% loss)	0.108	12–15 / 33.9	**~125× / ~314×**
LEO pulsed jamming (20% loss)	2.5	30	**~12×**
LEO DoS flooding (2% loss, 150 ms)	0.2–0.3	40 (10–70)	**~160×**

An NQX-encrypted tunnel carrying ARCA SATCOM traffic, run without and then with optimization over Starlink LEO, simulated MEO and GEO, and LEO under simulated attack. Gain = optimized ÷ baseline mean bitrate, using midpoints where a baseline was a range. The MEO baseline ran with 50 ms added delay vs. 30 ms optimized.[1]

Clean links

Gains grow with latency: about 2.5× on LEO, 14× on MEO and 83× on GEO, where throughput rose from 0.3 to 25 Mbps.

Attacked links

Jamming, pulsed jamming and DoS flooding cut unoptimized throughput to 0.1–2.5 Mbps. With optimization it held at 12–40 Mbps.

Security unaffected

Packet captures showed only unreadable ESP after NQX. With post-quantum re-keys every 50 s, optimized LEO traffic held about 30 Mbps.

SPECIFICATIONS

	SSH NQX™	CYSEC ARCA SATCOM
Function	Network encryptor for Ethernet (L2) and IP (L3) traffic	Secure transport endpoint with integrated performance-enhancing proxy
Protocols	IKEv2 / IPsec; PSK key lists and X.509 PKI; IPv4/IPv6 dual stack, BGP4	TLS 1.3 end to end; QUIC-based secure transport; intelligent QoS
Post-quantum	ML-KEM and FrodoKEM key encapsulation, hybrid mode, crypto-agile	Quantum resistant symmetric encryption, TLS 1.3 with PQC as default
Performance	1 to 100 Gbps by model (NQX 120 to 5200), measured with PQC enabled	7–8× throughput vs. an IPsec baseline on satellite links (CYSEC data)[4]
Bearers	Any Ethernet or IP transport: xWDM, MPLS, internet, satellite, 5G	GEO VSAT, LEO including Starlink, 5G, HF, Wi-Fi; multi-orbit ready
Assurance	NCSA-FI TL III (EU Confidential); NATO and EU Restricted in process	Qualified on a commercial GEO operator network; ESA ARTES 4S
Keys and integrity	Operator-held keys with automated rotation; Secure Boot, remote attestation, emergency purge	Operator-run key management; CYSEC holds zero keys; customer-controlled attestation
Form factor	Appliances; VM; NQX 120 for remote sites and ground stations; central management	Appliance, VM, on-board, or SDK inside third-party encryptors

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Sources: [1] Real world performance and resilience test results on a customer site. [2] EU Coordinated Implementation Roadmap for the Transition to PQC, June 2025. [3] EU Commission (GOVSATCOM, Jan 2026); ICEYE–Nokia announcement, 1 Oct 2026, cited as a market example only. [4] CYSEC measurements on Starlink, GEO VSAT, 5G and HF links. NQX data: ssh.com/products/nqx; NCSA-FI approval for NQX v2.2.9, July 2024. NQX™ is a trademark of SSH Communications Security. ARCA SATCOM is a product of CYSEC SA.