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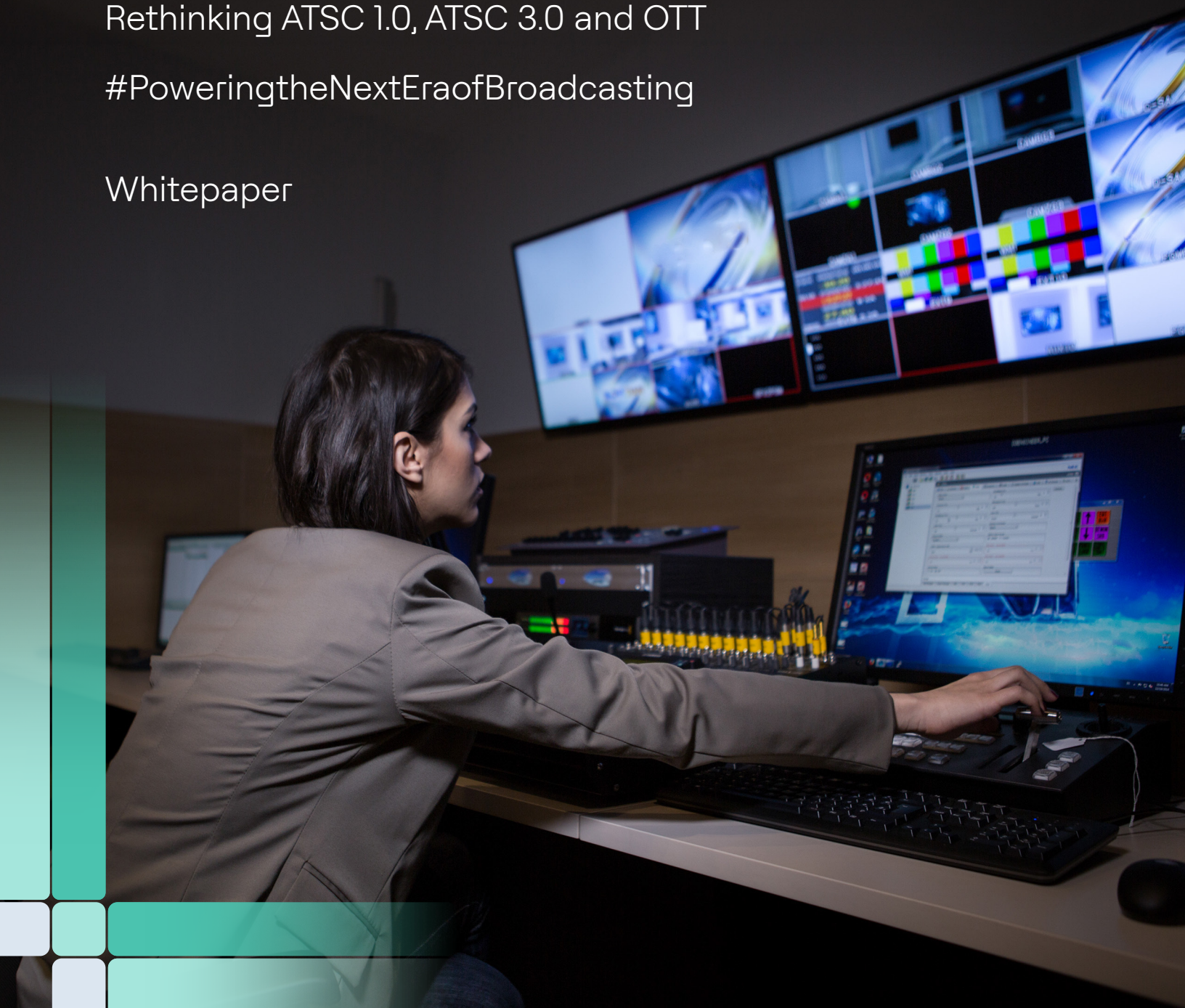
From fragmented pipelines to centralized hybrid operations

Rethinking ATSC 1.0, ATSC 3.0 and OTT

#PoweringtheNextEraofBroadcasting

Whitepaper



Today, a single piece of content is delivered across three ecosystems simultaneously: ATSC 1.0, ATSC 3.0 and OTT. Each operates with its own encoding, packaging, signaling, monitoring, transport and operational tooling. Over time, this has created a fragmented operating environment where broadcasters maintain parallel infrastructures for the same content, with separate runbooks, separate dashboards, separate vendor portals and separate teams firefighting in isolation.

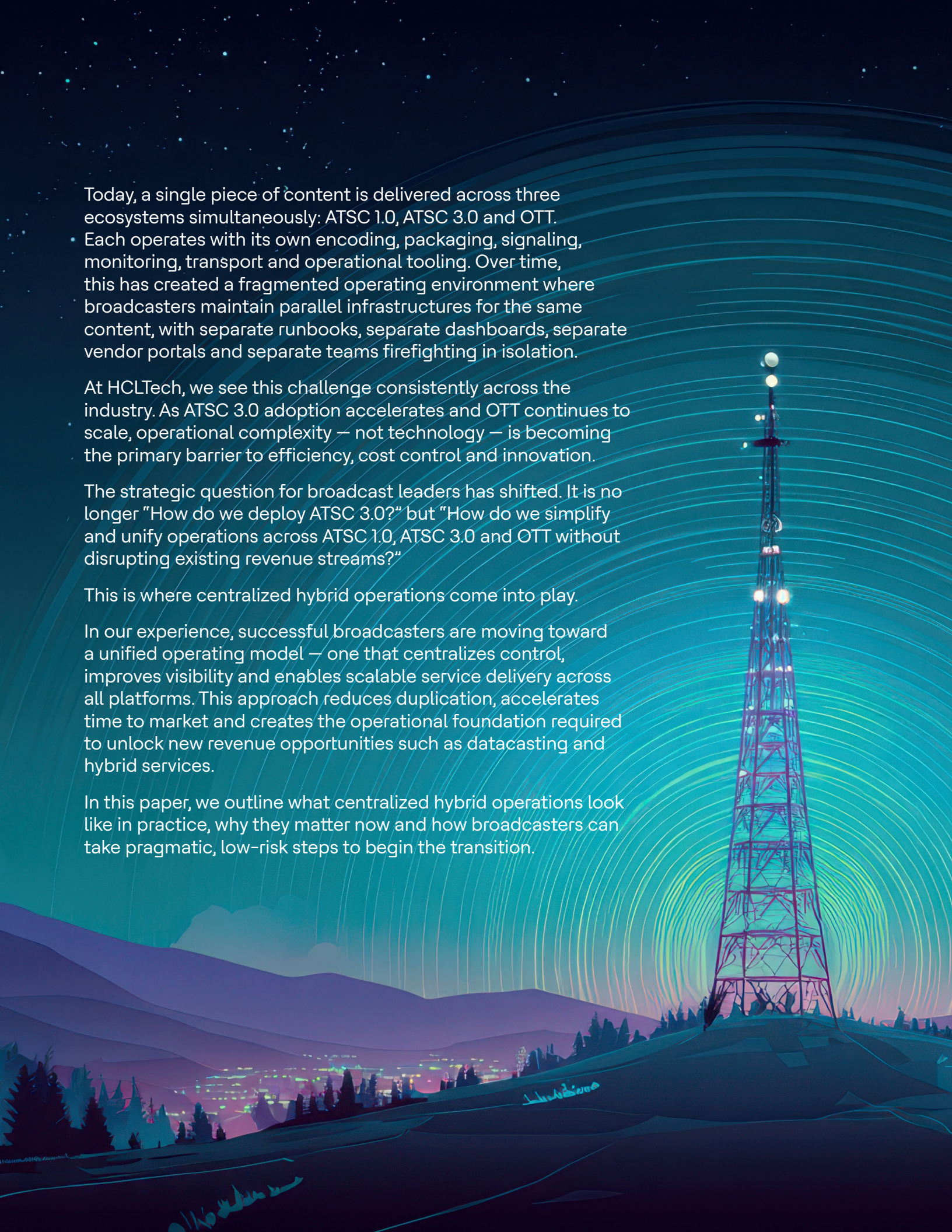
At HCLTech, we see this challenge consistently across the industry. As ATSC 3.0 adoption accelerates and OTT continues to scale, operational complexity — not technology — is becoming the primary barrier to efficiency, cost control and innovation.

The strategic question for broadcast leaders has shifted. It is no longer "How do we deploy ATSC 3.0?" but "How do we simplify and unify operations across ATSC 1.0, ATSC 3.0 and OTT without disrupting existing revenue streams?"

This is where centralized hybrid operations come into play.

In our experience, successful broadcasters are moving toward a unified operating model — one that centralizes control, improves visibility and enables scalable service delivery across all platforms. This approach reduces duplication, accelerates time to market and creates the operational foundation required to unlock new revenue opportunities such as datacasting and hybrid services.

In this paper, we outline what centralized hybrid operations look like in practice, why they matter now and how broadcasters can take pragmatic, low-risk steps to begin the transition.



Why this matters now

ATSC 3.0 deployments continue to expand, but most remain operationally siloed from the rest of the broadcast and OTT estate. ATSC 1.0 must keep running. OTT keeps growing. CDN costs and operational overhead keep rising.

Other regions have avoided extended dual-standard operation — DVB markets, South Korea Brazil have all moved with relatively clear timelines. The U.S. is different. Regulatory timing, market structure and business realities are creating a prolonged dual-standard period. ATSC 1.0 is paying the bills; ATSC 3.0 represents the long-term opportunity. Handled wrong, the result is a permanent second operational universe.

The question is no longer whether broadcast operations will converge. It is whether convergence happens proactively — through an intentional operating model — or reactively, under cost and risk pressure.

The cost of three parallel workflows

Each of the three delivery paths has its own operational character. ATSC 1.0 is transport-stream-centric, station-centric and hardware-heavy — reliable and deterministic but typically isolated from modern IP and cloud tooling. ATSC 3.0 is fundamentally different: an IP- and software-oriented architecture that behaves more like a service platform than a broadcast chain, with service lifecycle, signaling orchestration and IP distribution as first-class operational concerns. OTT is cloud-native, automated and elastic — but in most broadcast organizations it sits in a separate operational silo from broadcast engineering.

When these three are managed as separate domains, the cost is structural rather than incidental. In our experience we typically see:

Duplicated encoding, packaging, monitoring, alarming, runbooks, vendor portals and provisioning processes

Fragmented teams with partial views — when something breaks, no one sees the whole service

Longer MTTR, slower launches, inconsistent SLA reporting and limited end-to-end visibility

Higher OPEX, increased change risk and underutilization of the ATSC 3.0 capacity already paid for

An inability to operationalize the new revenue streams ATSC 3.0 actually enables

This is not sustainable as a long-term operating model — particularly when the dual-standard period in the U.S. will last years, not quarters.

The target operating model

The future operating model is not three workflows held together by manual coordination. It is a single architecture with multiple delivery outputs. We define this model through four shared layers:

1

Unified content and ingest

One operational entry point for live, file-based, cloud, partner and syndicated sources — handling metadata capture and enrichment, readiness validation, QC, compliance checks and AI-assisted captioning, language support and classification before content ever enters a delivery path. The same content, metadata and operational state become reusable across ATSC 1.0, ATSC 3.0, OTT and datacasting.

2

Standard-agnostic playout

Traditionally tied to individual broadcast chains, stations or channels, playout becomes a service layer that assembles content once and feeds every delivery ecosystem. Linear channel scheduling, playlist execution, graphics and branding, SCTE-35 ad signaling, emergency alert insertion, regionalization and multichannel operations all run from the same place — standard-agnostic by design, deployable centrally or distributed.

3

A centralized control plane

The orchestration layer governs how services are created, modified and retired across the entire footprint. It abstracts standard-specific differences and presents operators with consistent workflows, policies and service lifecycle controls. Four operational domains live here: service lifecycle and orchestration (onboarding, channel instantiation, ROUTE/MMTP coordination with parallel OTT services); monitoring, visibility and compliance (fleet-wide service status, alarm aggregation, quality monitoring); incident, failover and resilience control (centralized detection, automated recovery, planned failover, disaster recovery); and integration and operational automation (OSS/BSS, ticketing, policy-based automation, API-driven operations). Crucially, the control plane sits above encoders, muxes, RF chains and hardware — it does not replace them.

4

Unified observability

One correlated view across RF metrics (MER, SNR, BER, transmitter status), IP metrics (packet loss, latency, multicast status), video metrics (encoding health, segment availability, manifest integrity), OTT metrics (origin status, CDN performance, player QoE) and workflow metrics. The value is not collecting alarms — it is correlating them into service-level visibility, so a single service impairment showing up as an RF symptom at one site, a signaling issue at another and a CDN degradation in OTT can be traced to the same root cause.

Importantly, this architecture does not require replacing every system. It can be introduced incrementally by adding orchestration, unified ingest, telemetry and automation around the systems that already exist.

From architecture to production reality

While the centralized hybrid model is often discussed at a conceptual level, it is already being implemented in production environments at fleet scale. Broadcasters are moving beyond station-centric operations by introducing centralized control planes that orchestrate service lifecycle, observability and automation across both core and edge infrastructure—without disrupting existing ATSC 1.0 operations or OTT workflows.

In practice, this model is delivered through a layered approach: a centralized control plane governing services and policies, combined with lightweight local execution at stations and transmission sites. This allows broadcasters to standardize workflows, automate provisioning and introduce new services consistently across markets, while maintaining local autonomy and resilience.

The key to making this work is incremental adoption. Rather than replacing existing broadcast chains, broadcasters introduce orchestration, service-level telemetry and workflow automation around existing broadcast chains—progressively moving from parallel workflows to a unified operational model. This approach has proven critical in translating architectural intent into operational reality at scale, enabling measurable improvements in time-to-launch, operational efficiency and service reliability.

This model is not theoretical—it is already enabling broadcasters to transition to scalable, service-driven operations while preserving existing revenue models.

Where convergence happens

Convergence does not mean making all systems identical — it means converging where it delivers operational value and leaving the rest alone. We see four high-value areas matter most:

Encoding

A shared encoding strategy reduces duplicated infrastructure and enables consistent quality profiles across ATSC 3.0 and OTT. ATSC 1.0 may continue to require a transport-stream workflow, but upstream content processing and operational management can still be unified.

Packaging

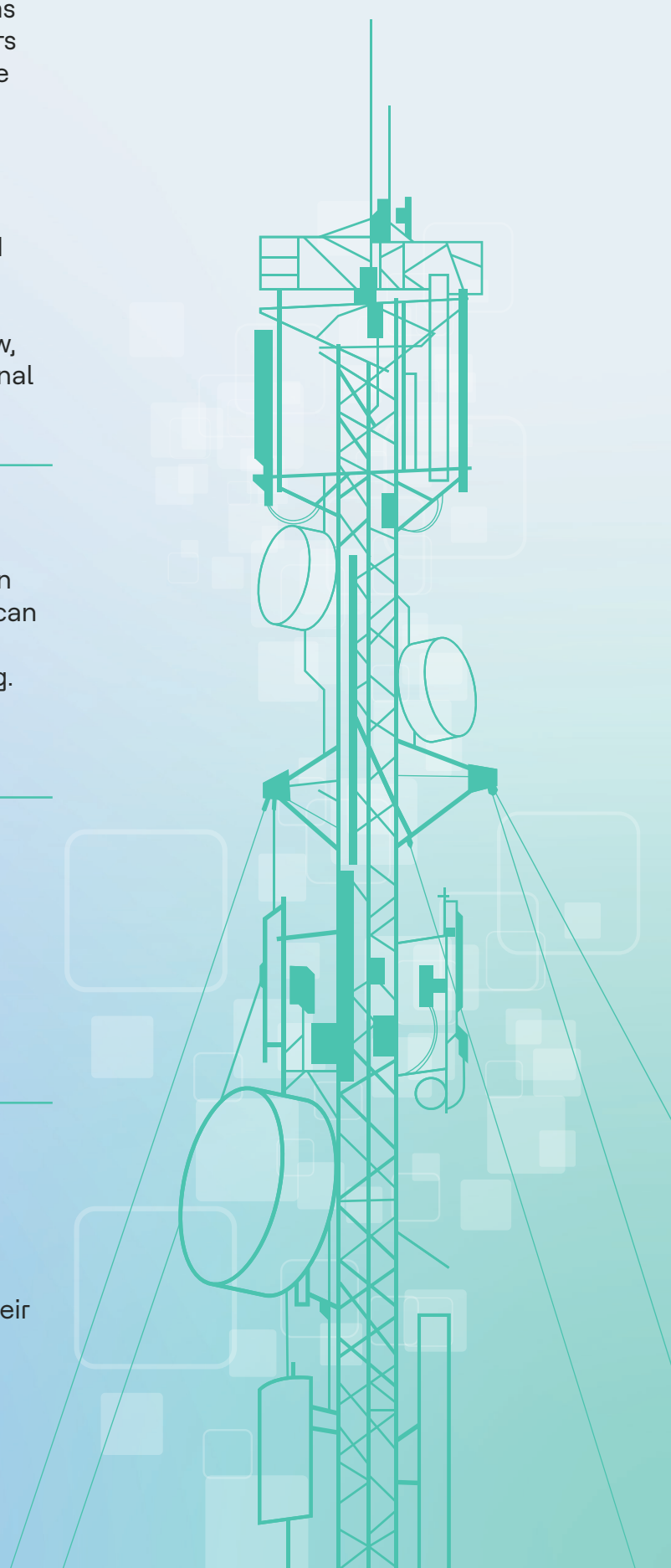
ATSC 3.0 and OTT are architecturally closer than most teams realize. Both are IP-oriented; both can use DASH-based structures; both benefit from common metadata, automation and monitoring. This is the most underexploited convergence opportunity in the U.S. market today.

Playout and channel assembly

Instead of separate per-platform workflows, broadcasters centralize scheduling, playlist execution, ad signaling and content readiness once — then feed the appropriate delivery path downstream.

Control and observability

A single control plane orchestrates service lifecycle across encoders, packagers, muxes, ROUTE systems, origins, CDNs, STLTP gateways and exciters. A unified observability layer ties their telemetry into one correlated service view. This is where operational transformation becomes real — and where most of the OPEX and MTTR improvements actually materialize.



Addressing the two executive objections

Two questions consistently arise in every CTO and COO conversation about this model. Both deserve direct answers.

1

"Are we centralizing content and giving up local control?"

No. The control plane decouples control from execution. Control — policies, templates, workflows, observability — is centralized. Execution stays local, close to the content, the transmitter and the market. Local news, market-specific programming and editorial decisions remain firmly at the station. Pre-approved templates and engineering-validated configurations replace station-by-station re-engineering, but markets keep the parameters they need. The balance is centralized efficiency with localized relevance — and by removing infrastructure burden from stations, this model strengthens local coverage rather than weakening it.

2

"Doesn't centralizing the brain create a single point of failure?"

No, and the architecture is the answer. The Broadcast Core runs as distributed microservices with regional redundancy — cloud, hybrid or on-prem depending on the broadcaster's model. There is no monolithic server. The real safety net is the local Station and Site Manager: if the Core becomes unreachable, the local agent continues executing the last known workflows, keeps telemetry flowing locally and syncs back when the connection restores. Control is centralized; execution is decentralized.

Integrating legacy ATSC 1.0 — no APIs required

The most common technical objection to this model is: "ATSC 1.0 equipment is legacy — there are no modern APIs. How can it be integrated?"

It can, because integration is operational, not device-centric. The model does not require legacy equipment to behave like cloud-native software. ATSC 1.0 is treated as a stable, revenue-generating service endpoint participating in a shared lifecycle. In production today, this is accomplished through external telemetry from exciters, STL links, multiplexers and TS monitors; alarm ingestion via SNMP, log scraping, dry contacts or vendor management interfaces; off-air monitoring to validate service health independent of device APIs; service-level modeling above the hardware; and fleet dashboards that normalize health across heterogeneous vendor gear.

ATSC 1.0 encoders and multiplexers keep doing what they do reliably. The control plane governs lifecycle, visibility and consistency from above.

Where AI becomes operationally useful

Once ingest, service lifecycle, observability and cost telemetry are centralized, AI becomes a practical operational amplifier — not an abstract capability. It works because it operates on normalized signals, consistent service definitions and standardized workflows, not because it understands isolated devices or standards. Four production-grade use cases matter most for executive audiences:

Cross-domain incident correlation.

Symptoms across RF, IP, video and OTT telemetry are correlated to ranked probable causes — e.g., MER degradation at an ATSC 1.0 site, ROUTE session instability in ATSC 3.0 and CDN buffering spikes in OTT all traced to a common upstream contribution or STL transport issue. The output is a ranked root cause with confidence indicators, not raw alarms.

Predictive degradation detection.

Timeseries analysis on MER/SNR trends, transport continuity, packet loss, ROUTE object delivery and CDN edge metrics surfaces warnings in operational terms ("elevated risk of impairment within 24–48 hours"), enabling proactive intervention rather than reactive recovery.

Intelligent alarm reduction and prioritization.

ML models analyze historical alarms, maintenance windows and service dependencies to deduplicate, suppress noise and prioritize based on service reach and audience impact. NOC operations shift from device-centric firefighting to service-centric decision-making — without changes to legacy encoders or multiplexers.

Change-risk assessment.

Models trained on incident frequency, MTTR trends, change success rates and rollback history score the risk of proposed changes and recommend phased rollouts, validation steps or automated rollback triggers — supporting central change governance without removing local execution autonomy.

Critically, none of this depends on real-time APIs into legacy ATSC 1.0 equipment. AI works here because the operating model is unified — not as a substitute for it.

Turning operations into financial discipline

A unified operating model produces something most broadcast organizations have never had: a clear, real-time line of sight from engineering telemetry to financial outcomes. In a dual-standard world with OTT on top, cost pressure is driven by duplication — multiple toolsets, parallel workflows and over-provisioning "just in case." Centralization makes that pressure measurable and therefore manageable.

Once consumption telemetry is segmented by service, market, station and core-versus-edge resources, executives gain controls that previously did not exist: cost per station and per market for benchmarking, cost per service for portfolio decisions and new-service business cases, CapEx deferral through pooled shared resources instead of station-by-station upgrades, event-based scaling that aligns capacity with real demand (sports, elections, emergencies) and predictable OpEx envelopes that reduce budget volatility.

The result is financial discipline produced by operational visibility — not by separate finance tooling layered on top.

Launching a new service: before and after

Consider launching a new channel, FAST stream, ATSC 3.0 service or datacasting service.

In the traditional model, the team prepares content manually, configures ATSC 1.0 mux changes, configures ATSC 3.0 ROUTE services separately, configures OTT encoding and packaging, updates origin/CDN settings, validates RF independently and monitors each path in different tools. Weeks of cross-team, multi-vendor coordination.

In the centralized hybrid model: content is ingested once, validated once, assembled once. Delivery workflows trigger automatically across ATSC 1.0, ATSC 3.0 and OTT. Service health is monitored end-to-end in one view.

The difference is not incremental — it is the difference between launching a service in weeks and launching it in days, with fewer manual steps and materially less change risk.

Operational maturity model

Convergence is a maturity journey, not a destination. Most U.S. broadcasters today fall between Level 1 and Level 2.

Level 1

Station-centric operations.

Systems managed locally with limited central visibility. Each station is effectively its own operational island.

Level 2

Parallel workflows.

ATSC 1.0, ATSC 3.0 and OTT operate separately, each with its own tooling, runbooks and teams. This is where most of the U.S. industry is today.

Level 3

Partial convergence.

Shared ingest, monitoring or encoding — typically one of these, rarely all. The first real OPEX and MTTR gains appear here.

Level 4

Centralized control plane.

Service workflows orchestrated across systems and stations. Engineering teams shift from firefighting to predictable, repeatable operations.

Level 5

Automated hybrid operations.

Unified ingest, playout, orchestration, observability and SLA reporting across broadcast and OTT, with AI-assisted operations and cost telemetry built in.

The practical question for CTOs and COOs is not which level is best in theory. It is: where are we today and what is the lowest-risk next step that demonstrates value within a single quarter?

The business case

Centralized hybrid operations address the root causes of duplication. Cost reduction comes from fewer duplicate encoding and packaging stacks, reduced manual provisioning, lower MTTR, better engineering utilization, less tool sprawl, more efficient station onboarding, better use of ATSC 3.0 capacity already deployed and CDN offload through hybrid delivery.

The financial benefit is not just lower infrastructure cost. It is faster execution, better uptime and readiness for new revenue — specifically the datacasting and hybrid services ATSC 3.0 enables: emergency information, software and file distribution, automotive data, education delivery, enterprise datacasting and broadcast-assisted broadband. These services need more than RF capacity; they need provisioning, entitlement, monitoring, SLA reporting and lifecycle management. Without orchestration, datacasting stays a proof of concept. With it, it becomes a manageable, monetizable service line.

How to start — without a big-bang transformation

The path to convergence does not start with rip-and-replace or require a multi-year program before delivering value. A practical pilot can begin with a single station cluster, a single ATSC 3.0 market, a single OTT service or a single datacasting proof of concept. Each is bounded enough to demonstrate value within one to two quarters.

Effective pilots target one or two measurable outcomes: unified service visibility across ATSC 1.0, 3.0 and OTT for one market; automated workflow handoff for one service category; centralized alarm correlation across one fleet segment; faster service provisioning for a new FAST channel; or cross-platform SLA reporting for the executive team. Prove operational value first; scale incrementally. While the journey from Level 2 to Level 4 typically takes two to three years, a credible business case should be deliverable within 90 days.

The strategic takeaway

ATSC 1.0, ATSC 3.0 and OTT will coexist for years. Managing them as isolated domains is a structural cost — in OPEX, in MTTR, in time to market and in the revenue opportunities ATSC 3.0 enables but parallel operations cannot capture.

The opportunity is centralized hybrid operations: one ingest layer, one playout strategy, one control plane, one observability model — multiple delivery outputs.

At HCLTech, we believe the next phase of broadcast transformation will not be defined by the ones who deploy the most newest technology. They will be the ones who simplify operations, unify control and turn convergence into a business advantage.

Call to Action

We work with broadcasters to assess current operating models and identify practical, low-risk steps to reduce operational complexity, improve cross-standard visibility, accelerate ATSC 3.0 readiness, prepare for datacasting and improve MTTR and SLA reporting.

Connect with us to explore how centralized hybrid operations can support your modernization roadmap.

About the Author

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Atheer is a Global Principal Solutions Architect for Media & Entertainment at HCLTech, leading solution strategy for broadcast, media, and large-scale video platforms. He works closely with broadcasters and media organizations to modernize operations through centralized architectures, intelligent orchestration and automation for hybrid and next-generation environments. With deep expertise in broadcast and digital media ecosystems, Atheer drives operational resilience, fleet-level control and scalable transformation of content and distribution platforms to enable long-term growth.