Building a
Business Case
for NG9-1-1

How to challenge norms and change mindsets to
create an NGSmart ESInet domain

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Atos

The next generation of emergency response capabilities is long overdue in the United States. This white paper provides tips on transition strategy while explaining how to build a business case that challenges the status quo to fund the transition to an NG9-1-1 end state. It includes detailed analysis based on an actual region in the southwest United States. Following our methodology saves this region millions of dollars annually — and the end of the project only opens the door to public sector modernization and smart cities.

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An Overhaul of Historic Proportion

The three most important digits one can ever dial: 9-1-1. Just as the American public relies upon and trusts our 9-1-1 system, first responders also rely upon the immediate and accurate delivery of each call. However, we live in a multimedia (voice, video, text, voice over instant message) world, and the system we all trust to manage and serve us when we "call" for help was not built to support the multichannel communication paths used by most people — from social to text to video.

In response, the U.S. public safety communications system is undergoing one of the single largest infrastructure overhauls in the country's history, transitioning from a telephone-driven voice system to a voice over IP (VoIP) multimedia-enabled software domain.

The systems that serve our emergency needs must have the same capabilities and operational enhancements as other technologies shaping our lives. To that end, the technology and systems migrations that will enable next-generation 9-1-1 (NG9-1-1) are happening throughout the United States

right now. Early adopters are sharing their lessons learned, setting benchmarks that will help the fast followers transform their infrastructures as well or better.

Responding to Voiceless Calls for Help

While initiating a voice call is and will always be the fastest way to request help, it's not always possible or convenient to use your voice during an emergency. It's a puzzle: A caller must have a voice without speaking. And first responders must be able to not only hear that call for help, as if from the ether, but also efficiently manage and process the response.

The simple answer is software. Hardware-based emergency response systems used by most public safety answering points (PSAPs) were not designed to provide seamlessly integrated communications across disparate subsystems in a configurable and scalable enterprise model to first responders and those who need help.

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Strategy with a Vision

NG9-1-1 is a collaboration of services and multimedia sources that must be managed as a unified call flow, not as separate product silos within a PSAP. Atos' vision for NG9-1-1 breaks down silos of independent systems to unify a communications ecosystem driven by network convergence. Voice will always dominate public safety contacts. What needs to change is the way voice and the data that accompanies it are delivered. They must be driven by a robust network engine.

One of the first things to understand for your strategy is that moving from a Tandem Office construct directly to an end-to-end geospatially powered NENA i3 ESInet domain is quite a leap. Our team of industry experts has learned firsthand that having a highly robust network migration strategy is critical to achieving a pure i3 end state. Phase the transition first to an all-IP managed network domain through a systematic clustered cutover process. Then, upon full migration to the multicore, layer-3 emergency services IP network (ESInet) domain, geospatial routing features can be turned up seamlessly in the same clustered approach as regional stakeholders are ready for them.

Network Topology and the Myth of the ILEC Provider

When it comes to ESInet migrations, there is no mandate as to which access is used for your network domain. Success for any NG9-1-1 modernization effort depends on knowing what options exist, which obstacles to overcome, and what strategies to use when designing the network topology. One widely believed myth is that an agency or PSAP must use services from the Incumbent Local Exchange (ILEC) provider of 9-1-1 services for all 9-1-1 services.

This is simply incorrect. Even further, it's the antithesis of what NG9-1-1 is intended to achieve. Elimination of single-threaded reliance on voice-only regulated service domains is core to a reliable and redundant ESInet that's also cost-effective and scalable. So, understand your options, challenge the status quo and focus on the future. Your strategy must answer the question, "What will our public safety ecosystem look like in 10 years, and how should we design it today to meet that future state?"

The NG9-1-1 Link to Smart Cities

NG9-1-1 is an initiative to empower the masses and better inform first responders by overhauling a 40-year-old telephony network that only transmits voice. Similarly, smart city initiatives are designed to empower the masses via the Internet of Things by creating a meshed network that allows for physical connectivity to endless information hubs.

These initiatives live on opposite ends of the spectrum. However, the objectives and design philosophies they share have set their trajectory to converge in a single intelligent framework. Both require networks that enable people and devices to send communications, as we see with machine-to-machine data delivery systems in which people are the recipients of information that makes their jobs more efficient, informed, proactive and safe.

If the future is an integrated, collaborative government services ecosystem where data not only powers decisions but also empowers agencies tasked with serving the public then one common ingredient determines its success: aligning NG9-1-1 with smart city solutions.

Atos uses a highly unique, customer-centric ESInet design strategy that addresses the needs of public safety as well as government services stakeholders in the deployment region. Rather than looking only at the serving locations and PSAPs, Atos sees NG9-1-1 as a means to modernize broader public services, using the ESInet and NG9-1-1 architecture and standards as a logical blueprint for modernizing the way cities, counties, regions and states serve the public.

Funding a Network in Decline

No more important network exists in the United States than the one we all rely upon in times of crisis, yet this network was rendered obsolete years ago when we began communicating with data. It's quickly degrading, relies upon outdated infrastructure, is increasingly vulnerable to cyberattacks — and it's limited due to regulatory stipulations that restrict its resiliency while hoarding the lion's share of 9-1-1 surcharge fees we all pay to keep this antiquated system functional.

ESInet domains require broadband data circuits, but the existing 9-1-1 networks are restricting the ability of public safety agencies to move to NG9-1-1 because of funding inequality. 90% of the funds collected (hundreds of millions of dollars) are being used to pay for a network that consists of circuits that could have been phased out and removed years ago. Regulated voice-only circuits, which cost as much as $500 per month, per line, are sucking the funds we all pay into a chasm of waste and ineffective network service. Why pay for that?

An NG-Smarter Mandate

Our mandate is to reduce this waste, improve network resiliency and capability, afford public safety and public sector agencies a choice to use assets that already serve their areas, and allow for the savings to be reallocated to 1) construct the network of the future and 2) provide for broadband communications to all service agencies.

As your network infrastructure transition partner, Atos can not only create your ESInet and power your NG9-1-1 ecosystem but also make this domain your region's smart city solution without changing a single roadmap. The means to this future state exist in our NGSmart solution, Atos' industry-leading model for modernizing public sector infrastructure using NG9-1-1 as the building block catalyst.

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Business Case
for NG9-1-1

Atos' model for all clients is to leverage their existing investments, offer flexible deployment options and focus on our expertise in technology transformation to help them do more with less. We'll do the same for your transformation from a voice-only TDM telephony system to a multimedia, IP broadband managed network domain, with an eye to resiliency and scalability of solution as well as cost and ROI.

To illustrate how it's done, the following scenario presents our approach to an NG9-1-1 project for an eight-county region to optimize and connect the capabilities of each county and PSAP stakeholder. Clearly the assets already exist in this region to serve the needs of the underlying infrastructure for the region's ESInet. What Atos presents and has analyzed is a means to shift the costs spent today to pay for the Next Generation Core Services (NGCS) and ESInet construction phase while reducing operating expenses via network and infrastructure optimization at the layer 2/3 domain.

In this region, like many others, items including number of CPE positions with respect to the overall call volumes seem to be excessive. Further analysis uncovers an opportunity to optimize some of these positions to become multimedia management and/or special skills-based positions rather than dedicated call-handling positions.

Looking at the number of calls and extrapolating to a daily call load when deployed as a networked ESInet region, this cost (not factored as part of the TCO analysis herein) would likely contribute to additional CapEx and OpEx savings if repurposed for other NG9-1-1 functions.

Key Data Points

Analysis of our sample region captures the entire ESInet migration program. Keep in mind that it won't correlate directly to your NG9-1-1 infrastructure modernization effort, as every jurisdiction is unique. To show how shifting reductions (regulated access) pays for NG9-1-1 managed network domain services, we'll focus on these key data points:

- A list of domain assets today
- Efficiencies to be gained
- Optimization and access alternatives
- Carrier facilitation and aggregation alternatives
- Cost transference options

Details of the Sample Region

- Highly reliant on an ILEC for its 9-1-1 circuits
- Covers 24 cities with multiple sources for network access
- Recently put a smart city initiative in place
- Has 26 PSAPs serving 4.1 million residents
- Handles more than 3.2 million calls to 9-1-1 annually
- Supported by two paired Tandem Offices, both restricted within the local access and transport area (LATA), delivering 1,360 regulated voice circuits to the PSAPs and public safety facilities

Bottom line for this region: selective routing and Automatic Location Identification (ALI) tariffs combined with existing maintenance and 9-1-1 services account for an annual cost of $8,160,000. This amount is strictly for 9-1-1 network services and does not include PSAP equipment or any ancillary 9-1-1 call-taking systems.

Break the Status Quo

When looking at the number of assets serving the region, the clearest path to take is the one less traveled: reduce circuits! A region processing 3 million calls a year does not need so many regulated 9-1-1 CAMA trunks. It may be the norm in a 9-1-1 environment but this mindset absolutely must change; the status quo is dangerous. 9-1-1 agencies tasked with serving the public absolutely should not pay for something that they do not use.

Your business case for NG9-1-1 needs to break the status quo by determining what the biggest barrier to change is. In the case of building an ESInet, that barrier is the current network architecture and the sheer number of access lines contained within it — the single biggest cost for any 9-1-1 operation. Gather the data on your network and let this data tell the story to your constituents, stakeholders, fiscal planners and citizens served.

Two data sets: call volumes and circuit counts are all it takes to see firsthand the underutilization of assets, percentage of assets underutilized as an aggregate, and cost per call. By extrapolating this data, we can clearly see that not only is the status quo extraordinarily inefficient and costly, but we can also define a path forward that reduces waste, leverages the region's existing assets, improves service quality and capability, and decreases total cost of ownership (TCO).

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# **Data** on Cost Reductions and Transference

Reduce Regulated Assets to Improve Utilization

In looking at the situation in this region today, and laying the migration strategy in place using mixed assets and a managed network design architecture, we begin reducing the number of regulated assets based on two factors: underutilization (depicted in Figure 1) and transition of network services aggregation.

The reduction of circuits, in lieu of provisioning mixed assets serving the PSAPs, begins during the conversion year, aligning the new NGCS data center services to accept direct trunk termination from the carrier domain. This conversion period accounts for the downstream (egress) side network of the ESInet being turned up in parallel with decommissioning/reduction actions, as a significant portion of the underutilized regulated assets are connected directly to the PSAPs themselves. This is possible simply by switching to network assets that are faster, more diverse, contain multiple strands of fiber, and already exist and connect to the PSAPs.

How can one substantiate that this is even possible to do? The business case shows the current utilization rates of existing network assets and correlates the reduction to gained efficiencies. The data tells a clear and concise story showing waste and tying that waste to both underutilization and cost. The picture is immediately clear that the money is not only there to build the ESInet, but that additional savings can be gained beyond the deployment of the NG9-1-1 network domain.

Fig. 1, Regulated Asset Reduction - Utilization Gains


Regulated Asset Reduction - Utilization Goals
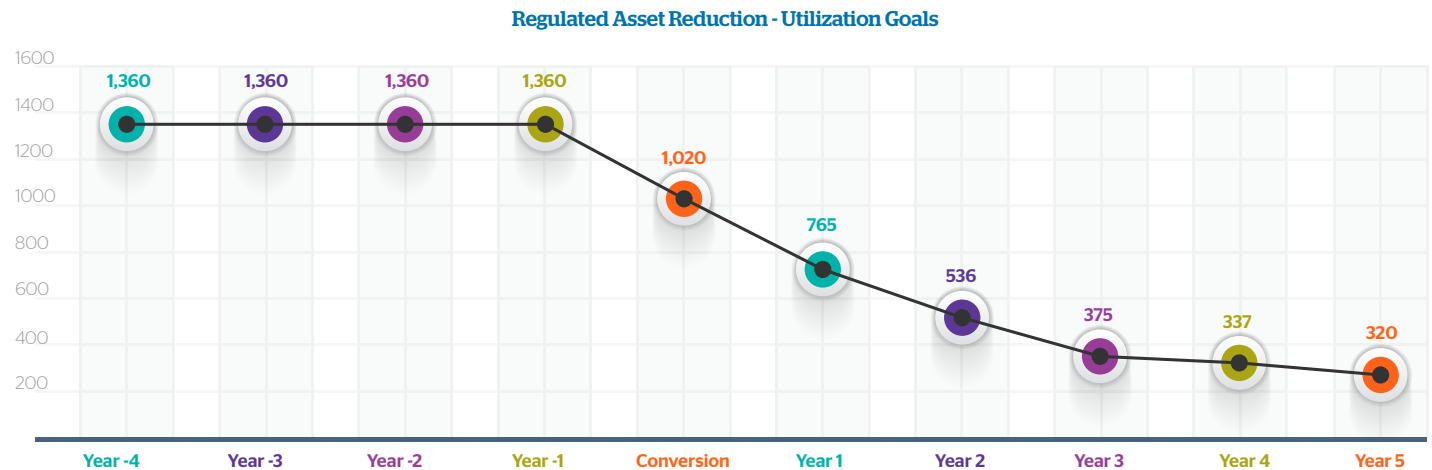
The Effect on Utilization Rates

With an inequitable distribution of network circuits and legacy CAMA trunks that are underutilized based on both county-level and regional traffic, Figure 2 reflects the asset utilization averages today versus gains in efficiency over the course of the contract. Rather than pay for what is no longer used, we optimize assets with the regional stakeholders to:

• Eliminate waste

• Only retain regulated assets that are critical to operations

• Leverage owned and/or wholesale assets

• Diversify the network

• Decrease total cost

Fig. 2, Circuit Utilization and Optimization
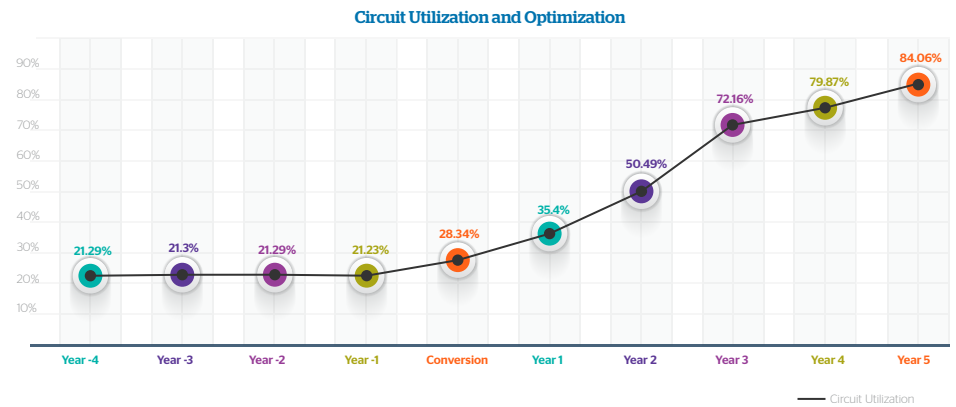
Regulated Service Cost Transference

The key to transitioning to a mixed asset model is having a plan to decrease the costs of underutilized assets. When auditing the use of legacy 9-1-1 trunks, for example, most are still deployed and serviced based on landline call volumes even though wireless traffic has driven calling patterns in the opposite direction. This trend will continue as mobile device use increases, populations grow and demographics change. Figure 3 represents the typical cost reductions specifically related to regulated voice-only traffic experienced in an ESInet deployment with cost reductions being pulled to the egress (ESInet) side for concurrent build-out and transformation.

Fig.3, Regulated Asset Cost Reduction
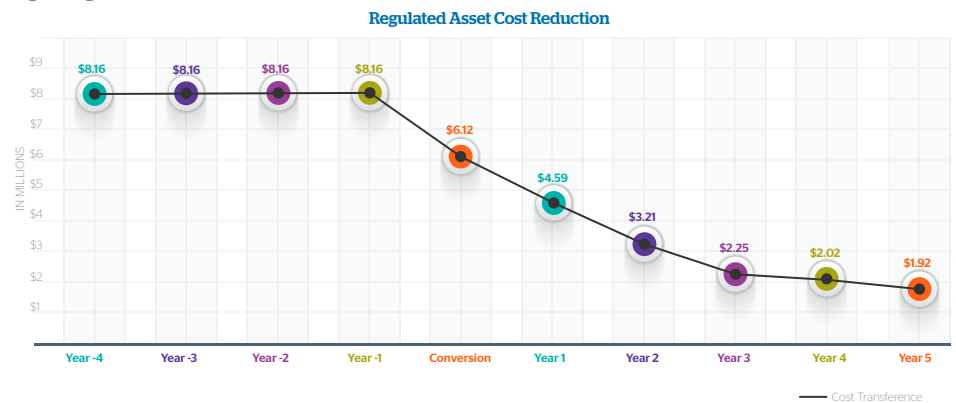
ESInet Cost Curve

As the reduction in regulated, cost-restrictive network assets continues, and the transition to ESInet mixed assets is completed, the savings gained through the conversion period are readily apparent.

Watch out for ESInet providers that preserve existing assets and then present a conversion period cost increase. In our experience, it's possible, with care, to transfer savings gained during the outset to capture the conversion costs and **reduce** the operating expense following full transition to the ESInet domain.

The model still reflects a preservation of regulated assets, hence the flattening of the reduction in years 4-5. While the option is there to continue the reduction at a more rapid pace equaling further cost savings, the transition to a domain completely free from centralized automatic message accounting (CAMA) is more likely to occur after the initial 5-year term.

Fig. 4, ESInet Cost Curve - Full Transition Regulated Only to Redundant 100Mb Per PSAP Domain
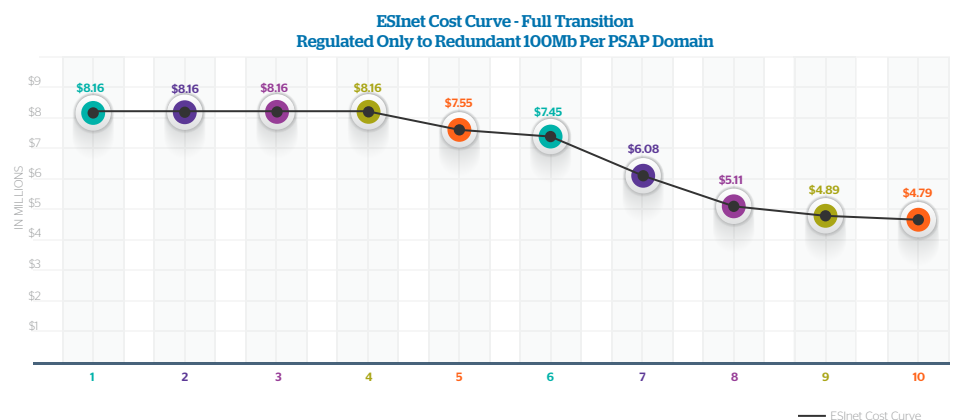
Reduce Cost per Call

Through transference of cost from today's voice-only regulated domain to an IP-broadband, mixed asset, managed ESInet ecosystem; Figure 5 shows the region cuts per-call cost nearly in half and also reaches an NG9-1-1 end-state capability.

Fig. 5, Cost per Call - Regulated to ESInet Domain
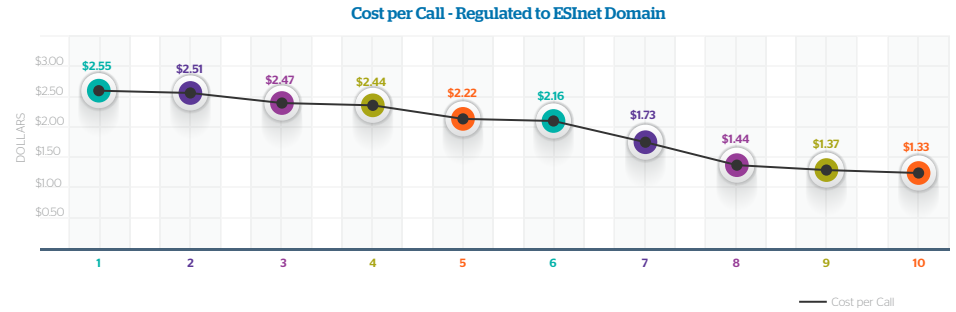
Cost Reduction from Legacy to ESInet

This region's first responders, PSAP professionals and citizen stakeholders should not accept excessive costs for underused or unused assets, yet we all pay into a fund that has preserved this status quo. By looking at the data, this region's stakeholders are able to see how they can afford and build an infrastructure domain that supports voice and data cost-effectively and securely.

Our model provides a 41% reduction in network costs, shown in Figure 6, builds the ESInet domain comprising mixed assets (ILEC and non-ILEC provided), increases reliability and scalability, and provides the framework architecture for the region to build upon.

Fig.6, E9-1-1 to NG9-1-1 ESInet Domain Cost Reduction vs. Legacy as Percent
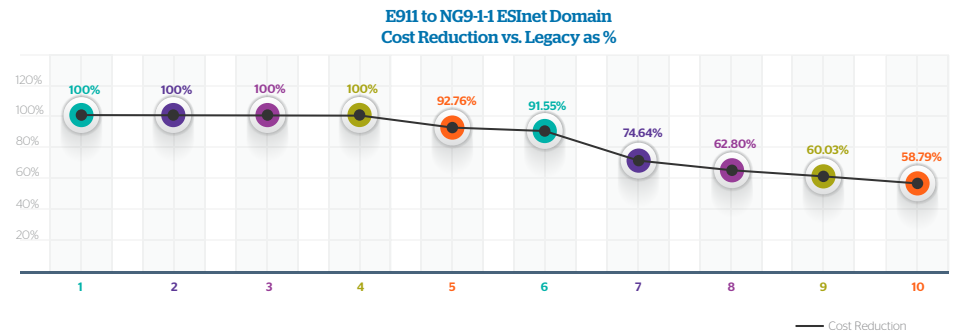
10-Year TCO

Using the Atos approach to ESInet regionalization, as reflected in Figure 7, the region would not only deploy a state-of-the-art NG9-1-1 managed network, but also reduce costs. Note that this cost curve includes the buildout/conversion years of the Atos NGCS ESInet domain. **When factoring in original CapEx buildout costs of the current infrastructure, the savings and 10-year deltas would likely present a total apples-to-apples savings of more than 41%.**

Fig.7, 10 Year TCO - Atos ESInet vs Legacy Carrier Domain
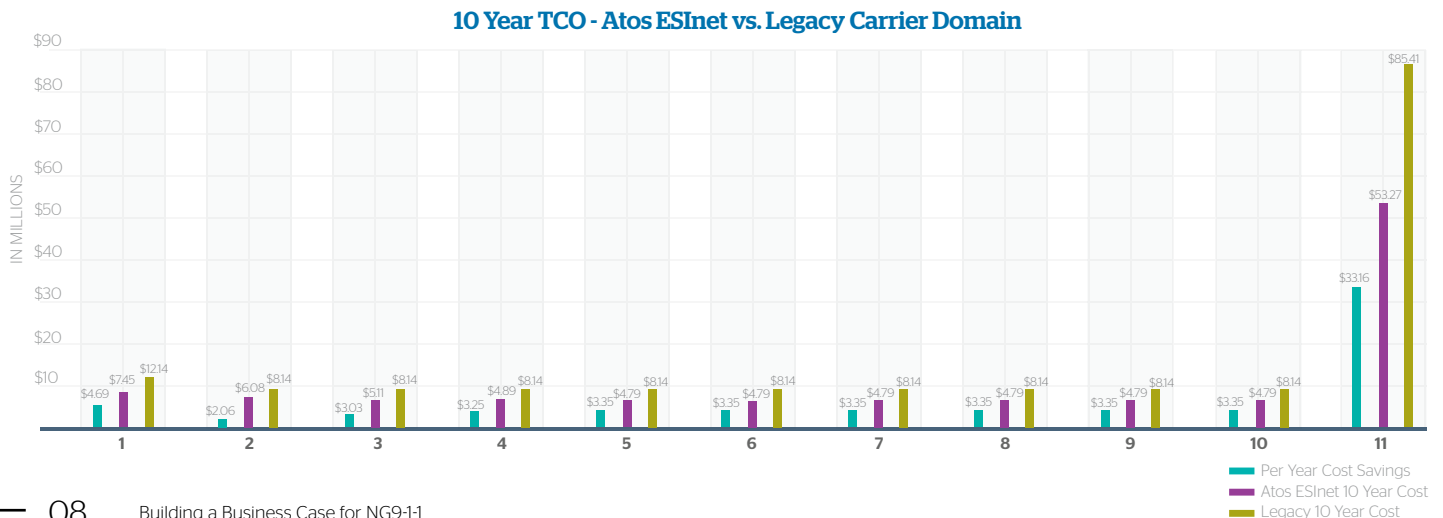
Project Conclusion

At the end of its NG9-1-1 upgrade project with Atos, our sample region reaps these benefits and more:

- Foundation built for NG9-1-1

- Redistribution of fees already collected

- Elimination of waste

- Creation of a redundant, resilient, multi-nodal 99.999% diverse network domain

- 10-year savings of $33.1 million ($3.3 million annually)

The money saved through this project translates into jobs created and preserved in an improved economy that's fit for fiscal transparency.

Going Forward

NG9-1-1 is a journey; a transition to an open and collaborative domain wherein no prescribed formula dictates success or completion. The only prescription for success is having a vision, a plan, a partner and a clear understanding of what it takes to achieve a next-generation networked IP domain.

Having provided this exact type of migration for client-partners in the United States and around the world, we have proven experience in an industry segment needing leadership beyond customer premises equipment (CPE) and Tandem Offices.

Our NGCS solution serves the high-volume calling and multimedia collaboration requirements of counties, states, even countries. Our OpenScape platform powers the United Kingdom's national telecommunications system, mission-critical included.

No provider in this industry has the same scalability and deployment expertise in large-scale migration programs to IP network domains as Atos, credentials that U.S. stakeholders can count on to lead beyond NG9-1-1. As we commit to all clients, our team can work as your partner to guide your migration from time-division multiplexing (TDM) to IP independence and empowerment.

About the Author

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A global public safety and security migration strategist, Rob Clark specializes in NG9-1-1/1-1-2 PSAP, ESInet and incorporating smart city ecosystem requirements to provide a single NGSmart blueprint for infrastructure modernization strategies. He leads Atos' NG9-1-1 organization, including strategic direction, solution alignment, partnerships, delivery models and total lifecycle sustainability models for public safety clients.

As lead subject matter expert for all Atos Public Safety offerings, Rob represents the organization in North America and abroad to align core competencies with market demands, customer requirements and forward-focused innovation.

About Atos

Atos SE (Societas Europaea) is a leader in digital transformation with circa 100,000 employees in 72 countries and pro forma annual revenue of circa € 12 billion. Serving a global client base, the Group is the European leader in Big Data, Cybersecurity, Digital Workplace and provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry. With its cutting edge technologies, digital expertise and industry knowledge, the Group supports the digital transformation of its clients across different business sectors: Defense, Financial Services, Health, Manufacturing, Media, Utilities, Public sector, Retail, Telecommunications, and Transportation. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and is listed on the Euronext Paris market. Atos operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline.

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