



The Rising Need for a Strong Network Resiliency Framework



Executive Summary

Communication services have undergone significant changes. The demand for ubiquitous, fast, and reliable service is at an all-time high and is anticipated to increase even more rapidly in the future. Both businesses and individuals have intricately integrated these services into their daily activities, making a return to previous ways unimaginable. Furthermore, networks are swiftly advancing towards new technologies, fundamentally transforming service delivery and yet increasing the risks that inevitably rise with network complexity.

This expectation places considerable pressure on service providers to enhance the reliability of their services. Failure to meet these standards often results in demands for change from both the media and government regulators. There is growing pressure on the Board of Directors and Executive Leadership of companies to ensure due diligence that the company is doing everything necessary to have a highly resilient network that provides the level of service required to meet these demands while at the same time ensuring readiness to respond when serious outages occur.

To help meet these challenging demands, we formed Technology Audit Partners. Our primary mission is to assist communication service providers to proactively understand how resilient their networks are as compared to best in class and to their peers. With this knowledge, critical steps can be taken to significantly reduce the risk of service outages.

We designed our services around a detailed and comprehensive Resiliency Framework that we developed based on our years of experience providing consultancy services in the event of network outages. We are experts in network resiliency, and we have a deep understanding of today's technology as well as upcoming advances.

The World Demands 'Always On' Service Now More Than Ever



In telecommunications, a challenge persistently faced by communication service providers traces back to the inception of communication services: the provision of reliable service.

While this notion appears straightforward, the actualization of high-availability networks necessitates substantial financial investment, committed leadership, a strong corporate culture along with the deployment of proficient and devoted personnel.

The last decade has witnessed a paradigm shift. The digitization wave has swept across the business landscape, and the proliferation of smart devices has become a staple in the daily lives of individuals. Today, smartphones, personal computers, and a myriad of smart devices are instrumental in facilitating many daily tasks. Individuals leverage communication services for managing finances, orchestrating their schedules, administering home functionalities, amongst other modern-day necessities and conveniences. This transformative era has been ushered in by the near-ubiquitous communication service provision, augmented by remarkable advancements in the speed and capacity of both wired and wireless communication technologies.

Today we demand 'Always On' service. The global community has transcended the era when such services were not the norm, and reverting is not an option. Service disruptions now bear increasingly significant ramifications, detracting from customer's Quality of Experience, impacting individuals' livelihoods, safety, and potentially undermining business operational viability and governance. Given this, customers have no choice but to gravitate to a service provider they can trust.

Outages, albeit unfortunate, are an inevitable reality, even for service providers with high network availability. The objective should be clear: minimize outage risks, lessen their impact on customers, quickly detect and assess any outage, restore service promptly, and learn thoroughly from each incident to prevent future recurrences. This requires a strong proactive and reactive resiliency framework.

'Always On' is now an important challenge for every Board of Directors and Executive Leadership team.



The trend requiring 'Always On' network connectivity was accelerated by advances in technology, the COVID pandemic requiring remote connectivity and expanded utilization in new areas of daily life and business operations to become critical national infrastructure. Reliable communications services are now pivotal for business operations, our wellbeing, and life-saving functions. This reliance implies a level of trust that businesses, end-users, governments, and regulators must have with communication service providers.

Additionally, rapid and fundamental technology changes such as software defined networks, artificial intelligence and 5G require constant adjustments to a network resilience plan as rapid migrations will be necessary. Rapid advancement of technology can improve network resilience but at the same time can increase the speed and scale of network outages.

Earning trust in network performance is not an overnight feat but a long-haul endeavor, displayed through consistent, reliable service. However, this hard-earned trust can be shaken with a single significant failure, leaving an indelible memory. Furthermore, recurring outages can cause the public and regulators to question management performance.

In this new 'Always On' culture, any service disruption catapults communication service providers to front page news and sparks customer outrage. This shift has increased regulatory concern, and launched investigations when these outages occur. Understandably, the Boards of Directors and Executive Leadership of communications service providers are under mounting pressure to ensure the networks that provide their service are highly resilient to network outages.



2022 - Canada regulator demands answers from Rogers for network outage



Softbank faced a large-scale outage in Dec 2018, affecting both voice and data services for several hours



2020 - FCC chair calls T-Mobile U.S. network outage 'unacceptable', vows probe



2021 - Another major outage of an ISP occurred in November, when Comcast's network backbone in San Francisco area went down for nearly two hours



The outage, which began in the early hours of December 6, 2018, left 30 million customer without internet access



Optus resolves 'major outage' that left customers unable to make and receive phone calls



2021 - Orange boss Stephane Richard came under political pressure on after a network outage at France's biggest telecoms firm prevented emergency calls for several hours



Telstra had multiple outages throughout 2016 affecting millions of customers



Verizon's outage was the first major outage of 2021 and hit users from Washington, D.C. to Boston.

Questions every Board and Executive Leadership team need to ask with clear answers being given:



Amidst this backdrop, we have heard several questions from Boards of Directors and Executive Leadership. While their organization will surely respond to these questions, it is often important that the Board seek an independent third-party view to ensure they understand their situation.

Evaluating Protection:

- Have our recent outages been because of one-off events or are there systemic issues that need to be addressed?
- In the event of regulatory scrutiny, would our due diligence towards network resiliency stand firm?
- Are we equipped with compelling responses to media inquiries concerning potential outages?
- How does our network resiliency benchmark against industry peers?

Assessing Readiness:

- Have we identified critical points in our network that could trigger systemic or prolonged outages impacting our customers?
- Is our design, operational strategy, and future roadmap robust enough to meet or exceed our customer 'Always On' expectations?
- In the face of an outage, are our processes adept at swiftly and independently understanding the issue, assessing customer impact, expediting resolution, and learning to avert recurrence?

Engaging in regular independent audits of the organization's ability to consistently deliver reliable service is no longer a luxury but a necessity. Like other critical organizational domains such as financial reporting and security, entrusting experts with a thorough and structured audit approach can unveil insights, bolster confidence among stakeholders, and demonstrate a steadfast commitment to delivering unwavering connectivity. Technology Audit Partners has specifically designed audit services to navigate service operators through this important journey, ensuring your network's resiliency is not just a claim but a proven asset.



Technology Audit Partners

Technology Audit Partners was established to address a critical need in the communications service sector. We provide an independent audit practice of communications service provider's network resiliency and compare them to best practices and their peers. This provides clear visibility to the Board and Executive Leadership to potential vulnerabilities that require their attention.

We have found tier-one service providers with fundamental deficiencies in their resiliency framework which made them vulnerable to significant and potentially recurring outages. In many cases, the Board of Directors and sometimes even the Executive Leadership did not fully understand the seriousness of these vulnerabilities.

For this reason, we developed our Resiliency Framework audit practice to evaluate a company's network resiliency. We provide a robust independent and cohesive evaluation of the company's proactive and reactive practice relative to their industry peers.

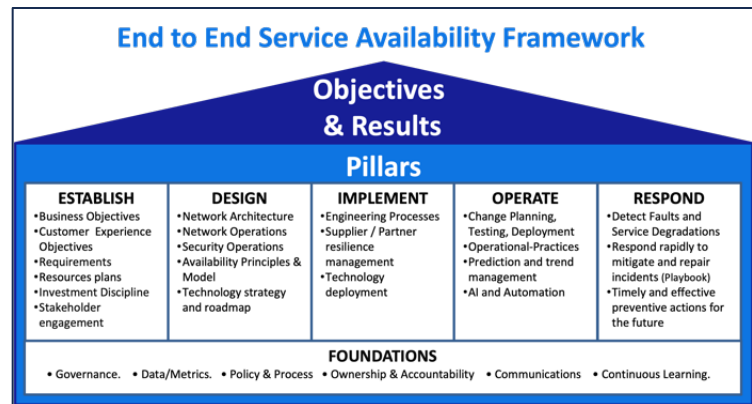
Our Resiliency Framework is tailored to quantifiably evaluate your network, people, processes, and culture, benchmarking your organization against industry best practices and peers. Through our Resiliency Framework audit regimen, Technology Audit Partners helps clients understand how to proactively build and operate a high availability network as well as be prepared to reactively recover an outage, minimizing customer impact.

We are a team of seasoned executives from the telecommunications and computing industries that have provided outage consultancy services to some of the largest mobile and fixed line operators. We are passionate about fostering design and operational resiliency within complex networks. We understand the challenges network operators face, along with the emerging technologies on the horizon, and are committed to nurturing highly resilient networks.

We recognize the paramount need for a company's Board of Directors and senior leaders to have an impartial perspective on service availability management. It is essential to provide a clear and simple explanation connecting resilience from board level to the engineer. We pride ourselves in our experience and ability to effectively communicate with technical staff and translate for board members and executive leadership. We objectively benchmark a company's performance against best-in-class and industry peers to provide crucial clear insights.

In the event of an unexpected outage, our experienced team, backed by a thorough understanding of your network, processes and organization from the full audit, can quickly provide you with an independent audit of your outage findings and actions to ensure the true underlying problems are being identified and addressed.

Our Resiliency Framework



Technology Audit Partners has designed a Resiliency Framework to provide the structure for a thorough, repeatable, and comparative audit of your company's network resiliency – connecting board level questions down to the engineer. We audit across a set of Pillars that constitute the essential components of a highly effective Resiliency Framework covering the full lifecycle. The Pillars comprise *proactive*, *reactive*, and *foundational* capabilities of the organization. The *proactive* capabilities evaluate how the service provider plans for and builds resiliency in everything they do. The *reactive* competencies assess how they identify, quantify, communicate, and restore a network outage. The *foundational* elements assess the common functions, processes, and ethos that sustainably enable and support the *proactive* and *reactive* functions.

The pillars are broken down into specific capabilities and practices that we refer to as *attributes*. We have identified dozens of attributes that characterize all aspects of service availability management, and these attributes are the specific items that we audit your company against. We work closely with your team to assess your competency against each attribute using a structured set of scripted questions, and we seek evidence for efficacy and consistent performance of that attribute. Each attribute is quantitatively scored, and these scores are aggregated into the associated pillars allowing us to generate a capability score for each pillar that helps an organization from the working level engineer to a member of the board to easily understand how they compare and areas that may need improvement. This bottoms-up approach lets us measure an organization's capabilities (progress) over time and compare a service provider to their peers at a basic level.

This audit process will aggregate key observations into findings. Notable/concerning findings will be escalated as 'Red Flags' if from our experience we deem them to be particularly important and in need of immediate attention.



Our Service Model

We pride ourselves on our ability to translate and communicate effectively with board members, working level engineers and managing layers in between. Through our years of experience, we have been in positions that required us to clearly articulate technical issues that can be a challenge for non-technical people. Also, we can translate board level decisions into relevant technical direction for engineers. We believe this is critical and a differentiating advantage of Technology Audit Partners.

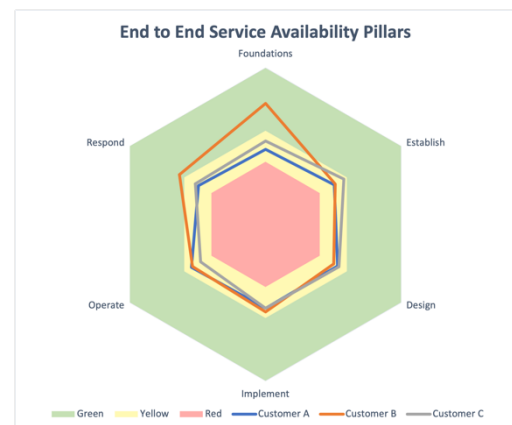
We believe that strong management of service availability is an ongoing process not an event. Because of this, Technology Audit Partners has developed a three-part service offering around our Network Resiliency Framework to create sustainable benefit for our clients.

Baseline Audit

Our initial service is our Baseline Audit. In this, we conduct interviews with your company's staff, review relevant documentation and seek evidence for the Pillars in our Resiliency Framework. You receive an audit results report with details regarding our findings and how you compare to your peer group from an independent auditor. This is meant to provide an excellent baseline that assists your organization in prioritizing your resiliency improvement strategies and improvement over time.

Our reports, while sometimes technical by nature, cut through technical jargon to ensure all levels from a board member to working level engineers understand exactly what we are explaining.

Another important benefit from this audit is that we are now intimately familiar with your company regarding network resiliency. In a way, through the process of conducting our Baseline Audit, we have become experts in this critical area of your business. You can think of this as an investment you have made in your future.



Annual Audit Update

After the Baseline Audit, we recommend an Annual Audit Update to determine your progress since the last audit. This is helpful in measuring progress in the company's intended improvement trajectory and also staying in front of rapid changes and advancements. Through this, we gain insight into improvements made over the last period and we learn about changes in the network in that period. Just like in the Baseline Audit, a report is produced that reflects our findings. This audit will move more

quickly than the Baseline Audit since we are already familiar with the company, and we are looking for a change from the previous audit.

This critical service ensures the company continues to focus on their network resiliency and demonstrates their commitment to investing to continuously improve for their customers.

The Board of Directors and Executive Leadership team continue to have important visibility to the company's resiliency work and can hold the organization accountable for the level they intend to maintain.

Independent Outage Audit

Even best-in-class service providers have outages. With the right resiliency framework, there will be fewer outages that impact fewer people for a smaller amount of time. However, no matter how strong a company's resiliency, outages will occur.

In that event, Technology Audit Partners can be quickly engaged to partner with your company to provide an independent audit of the root cause(s) of an outage and ensure all remediation being done is appropriate and to ensure the organization learns all it can from the incident. In the case of serious outages, speed, expertise and independence are critical.

We believe this to be extremely valuable as the company can quickly have a complete independent auditors view on an outage showing that the company has made a commitment to striving to understand outages quickly so they can make changes to minimize the chance of the incident recurring.

Summary

In today's digital landscape, the imperative for communication service providers to offer 'Always On' services has become unequivocally clear. Businesses and individuals alike have grown deeply reliant on these services, now deemed indispensable. A return to lesser dependability is simply inconceivable.

Service providers who do not meet expectations will begin to see impacts on their business as customers migrate to more reliable service providers, regulators and governments impose restrictions and oversight.

More than ever, there is a need for a firm commitment to a strong independent resiliency framework that meets the proactive and reactive demands to meet 'Always On' expectations.

We stand proudly for our mission of **resilience**, **expertise**, and **governance**.

Our independent assessment framework embodies **resilience**, our consultants bring years of **experience** in dissecting network outages and their deeper causes, and our commitment to **governance** assures you of an unbiased, thorough analysis of your network's capability to mitigate and swiftly recover from disruptions.

