Resiliency and Scalability in your Critical Communication Platform:

Reliability and Performance of the Everbridge Unified Critical Communication Suite

Resiliency and Scalability
in your Critical Communication Platform

When an incident happens, whether it's a natural disaster or an IT service outage, you need to get the right messages to the right people, as quickly as possible. Technology solutions, including those for critical communication, can be instrumental in helping your organization maintain continuity and recover from major events, but only if they are not also vulnerable to disruptions or performance degradation.

When evaluating resiliency and scalability, it is important to consider not only the technical merits of the solution itself, but also to understand how it performs in context. For example, a major weather event can compromise local infrastructure. A critical communication system has to be able to work seamlessly through these restrictions, and ensure that messages are delivered.

Likewise, scalability should be evaluated both on the ability of a system to scale as your organization grows, as well as its ability to scale to specific events and a variety of situations.

In this paper, we will cover essential points in resiliency and scalability in a critical communication platform:

- Redundancy of Operations and Services
- Scalability through Software as a Service (SaaS) and the Cloud
- Ensured Reliability through Complete System Monitoring
- Overcoming the Shortcomings of Available Infrastructure
- Scalability in a Global Environment
- Security and Compliance Certifications

Remember to fully evaluate a critical communication provider, understand the levels of security, performance, and availability of the system, and understand the costs of maintaining and scaling the system as your organization grows.

Redundancy of Operations and Services

Availability, in the traditional sense, is typically defined as the percentage of time that a system is operational[1]. Availability is especially important for critical communication systems, when reaching contacts with time-sensitive messages can have an impact on maintaining operations, or even health and safety. These systems need to be ready for any event, even if it impacts the location of the solution itself. For critical communication systems, the definition of "availability" also needs to be extended to mean that the essential business operations are available. In this case, it doesn't matter if your system portal is up, or if the user can log in. If you can't send out a critical communication, your system is not available.

Redundancy is a key factor in ensuring availability. Network Operation Centers (NOCs) and Data Centers are not immune to the impact of large events, such as fires, flooding, or major storms. For this reason, it is important to have multiple data centers that are geographically dispersed, ideally across the globe, continuously replicating data. This enables the system to facilitate rapid failover, ensuring no delays or disruptions in messaging if a single site housing your system fails.

If your critical communication system is hosted by a vendor, the existence of multiple locations has the added benefit of providing a level of staff and service redundancy. If an event or incident impacts operations at one location, staff from another location can take over, giving the organization the ability to continue operating seamlessly. Additionally, when employees are globally dispersed, they can offer true 24x7 support, ensuring that there is always someone available to help when an emergency or event happens.

In addition to physical redundancy, to provide a true no-single-point-of-failure system, every component of the system should be replicated as well. Disruption of any component of the critical communication system can prevent you from getting messages to your contacts. For example, if the web interface for the application is solely sourced out of a single facility, and that facility goes down, access to the website, and thus your system, will be blocked. So even though data may be replicated across multiple sites, a failure on the front end of the website means that all of that replication is meaningless until the vendor is able to restore web access at the failed facility.

The option to leverage a variety of telecommunication and downstream service providers adds to redundancy. This means that if any of a vendor's providers experience an issue, a new provider can be substituted, without a noticeable transition for the user or customer.

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[1] "Reliability and availability basics." EventHelix.
http://www.eventhelix.com/RealtimeMantra/FaultHandling/reliability_availability_basics.htm 1 Aug 2014

Scalability through Software as a Service (SaaS) and the Cloud

Choosing a Software as a Service (SaaS)-based solution is one way to address resiliency and scalability challenges. Software as a service (SaaS) is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted.[23] It is sometimes referred to as "on-demand software". SaaS is typically accessed by users using a thin client via a web browser.[45] Because of this, usage by the customer isn't constrained to specific locations or devices; in fact as long as there is internet access, SaaS solutions can be utilized from just about anywhere on a web enabled device[6].

Unlike solutions deployed at the customer's physical location, known as an on-premise system, SaaS-based solutions are typically more flexible, and capacity can be variable. On premise systems generally require new hardware or additional software to be purchased and implemented, which can be long and expensive processes, and provide barriers to expanding the use of a system.

Compared to on premise solutions, SaaS increases accessibility, extensibility, redundancy, and resiliency for those organizations that utilize it. Traditional SaaS-based solutions can still be constrained by fixed capacity depending on the infrastructure of the solution provider. For some vendors, redundancy through a secondary site may be available, but not able to be leveraged on demand. This can put performance at risk during a failover, and can also cause vulnerability when the provider locations are exposed to multiple, simultaneous events.

Everbridge addresses the challenges of traditional SaaS infrastructure by leveraging an *expandable* SaaS infrastructure. This expandable infrastructure provides the flexibility to quickly add and distribute capacity, while providing greater resiliency and lowering the risk of degradation and cascading failures. This expansion is seamless to both the users of the system and the customer, and ensures there is enough capacity to deal with sudden peaks in usage.

Another way to increase resiliency and scalability is by harnessing the power of the cloud. A cloud-based provider offers many benefits to an organization—first and foremost is increased storage and messaging capacity without the addition of hardware.[7]

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[2] "Definition of:SaaS." *PC Magazine Encyclopedia*. Ziff Davis. http://www.pcmag.com/encyclopedia/term/56112/saas. 31 July 2014
[3] Paul, Gil. "What Is 'SaaS' (Software as a Service)?". *About.com*.
http://netforbeginners.about.com/od/s/f/what_is_SaaS_software_as_a_service.htm. 31 July 2014
[4] Software as a Service, Wikipedia.com. http://en.wikipedia.org/wiki/Software_as_a_service. 31 July 2014.
[5] "IT Channel Glossary". compuBase. March 2013. http://en.compubase.net/IT-Telecom-Distribution-Glossary_a26.html. 31 July 2014.
[6] What Is Saas? Interoute. http://www.interoute.com/what-saas. 31 July 2014.
[7] Patterson, Mark. "Back to basics: The difference between SaaS and Cloud Computing." IT World.
http://www.itworld.com/software/109287/saas-and-cloud-whats-difference. 31 July 2014.

Traditional data center models can deliver a degree of scalability through expansion to additional centers to accommodate usage needs. But if the demand for capacity must be increased quickly to meet demands, leveraging the cloud allows dynamic scaling without impact on performance levels. The cloud can also act as a failover should one or more centers fail during an event.

While we typically refer to "the cloud" as a single entity, there are actually many cloud computing providers offering various services. For critical communication solutions, it is important to remain cloud agnostic. This will prevent the system from being constrained to a single provider. If a particular cloud computing provider experiences an outage or performance degradation, where servers might fail or lose power, being cloud agnostic allows the communication vendor to seamlessly switch to different underlying provider, preventing delays or interruptions in service.

Ensured Reliability through Complete System Monitoring

During large events, usage can increase significantly. Without safeguards in place, capacity limits can be quickly approached or often surpassed. Events can also physically impact your critical communications capacity, for example, if they disrupt the operations of a data center or storage partner and reducing overall capacity limits available for your use. To ensure reliability, a critical communications provider has to both know how to navigate these issues and have a process for identifying them in the first place.

Everbridge ensures reliability by monitoring the usage of its data centers, setting specific thresholds that will set off alerts if approached or reached. This monitoring takes place 365 days a year, 24 hours a day. When capacity triggers are reached, secondary centers or cloud servers can be used to gain more capacity.

Monitoring usage capacity alone isn't enough; consistent performance is also a key component of reliability. A provider must continually check each and every individual element of the system, including third party cloud servers, every database, and every element in the network and infrastructure. From an availability and performance perspective, Everbridge monitors each individual element of the system, and each individual downstream provider, so we can act immediately if an issue is discovered— before that issue impacts customers. Just as important, we also monitor the system at the service level, ensuring that services (such as the ability to send a broadcast) are available to customers. Moreover, we monitor user experience, by ensuring that the most critical workflows within the system are performing well. We measure them from outside our data centers, from the locations that matter the most: the ones that are as close to our customers as possible.

Everbridge developed a large scale testing environment that is completely separate from our critical communications solution known as the Mass Recipient Emulator (MRE) to test performance and user experience under real world conditions. The MRE simulates the behavior of thousands of recipients, when they receive a critical communications and allows us to understand the impact of their actions and reactions on the performance of our system. Each of these virtual users that are connected have a phone number that is connected to the publicly switched telephone network (PSTN), allowing us to exercise the full end to end workflow, from our system, to the public telecommunications infrastructure to the end users and back, who can respond to notifications with behavior resembling real people. From this simulation, it can gather data that will let the system know how much capacity is needed and how the system will work during a given event, for each specific part in the notification process.

Overcoming the Limitations of Public Infrastructure

During large scale events, use of public telecommunications infrastructure by individuals outside your organization can also have an impact on your ability to communicate. When an incident impacts a large number of people, use of communications can spike significantly. PBX systems or local telephony infrastructure can become quickly overwhelmed, making it difficult for some systems to remain resilient and send requested broadcasts. Understanding the capacity of local infrastructure, and employing technology that can work despite infrastructure interruptions, is a crucial aspect of system performance.

One way to improve delivery is through call throttling. Call-throttling enables organizations to pre-determine the optimal call volume for their broadcasts, allowing carriers to deliver notifications while avoiding congestion at any single network element.[8] Ultimately, this ensures the message is delivered as quickly as possible, while leaving some capacity (e.g. phone lines) open for other communications to go through.

If a critical communication vendor offers 'call-throttling', it generally means they offer a simple, single dimensional throttling mechanism. Everbridge, on the other hand, allows customers to set a predetermined call volume for user broadcasts based on their organization's best practices. The uniqueness of our approach lies in the fact that we can combine different throttling algorithms. We can rate-limit the number of calls overall for a broadcast, or simply for specific exchanges or calling patterns (for example, rate-limit calls going to a particular office building, but call cell phones as quickly as possible). We can also use a combined algorithm, setting a higher per-broadcast limit and a lower per-exchange limit, simultaneously.

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[8] http://www.everbridge.com/faq-call-throttling /

Call-throttling can be beneficial during large volume messaging, but cannot be the only method of ensuring resiliency during major events. During spontaneous, high impact events, service overload can cause interruptions of internet, cell, and other communication services. A multi-modal communication strategy ensures that you are targeting the individual, not the device, and increases the likelihood that message recipients can receive critical information when it matters most. The more communication vehicles are available—cell phone, home phone, email, text messaging, fax, pager, or PDA—the more likely it is that respondents will receive critical messages when infrastructure is compromised. As an example, following the bombings at the 2013 Boston Marathon, local data infrastructure couldn't handle the load of concerned citizens trying to make calls[9]. Fortunately, for local agencies and organizations using Everbridge, the system was able to utilize many messaging modes, including SMS, emails, and push notifications, ensuring that broadcasts were delivered to citizens, employees, and responders.

In all cases, resiliency considerations need to include an understanding of potential external infrastructure challenges during both major and minor events, and technology strategies for overcoming these challenges.

Scalability in a Global Environment

For organizations with globally distributed employees, customers, partners, or other contacts, additional considerations for messaging strategy and technology must be considered. In addition to support for local dialects, languages, and preferred communication methods, systems must be able to comply with local data laws and ensure local data delivery.

To support global scalability, user interfaces should be localized for ease-of-use. Communication expert Dr. Robert C. Chandler, Professor of Communication and Director of the Nicholson School of Communication (NSC) at the University of Central Florida (UCF) explains that the "ability to hear, see, listen, think, process, decide, and act" are diminished under stressful situations[10]. During an emergency, it can be increasingly difficult to perform even simple tasks quickly and accurately. Organizations can reduce the difficulty of communication tasks under pressure, and increase recipient comprehension, through a user interface in local language, messages delivered in local language, and voice messages in a dialect that is familiar to the recipient. Everbridge supports these goals through localized user interface options in 14 languages and dialects, with prompts and Text to Speech (TTS) available in 13 languages.

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[9] Mack, Eric and McCullagh, Declan. CNET. "Cell service hit in Boston following bombings." http://www.cnet.com/news/cell-service-hit-in-boston-following-bombings/ 1 Aug 2014.
[10] Chandler, Robert C. Best Practices for Communication Under Pressure. Everbridge. http://go.everbridge.com/CommunicationUnderPressure-web.html 1 Aug 2014.

To ensure global delivery, local carrier support is critically important. Relationships with these regional carriers can have as much impact on deliverability rates than technical infrastructures and capabilities. To this end, Everbridge supports two-way SMS delivery to 800 carriers in more than 200 countries, including dedicated local sender codes for regulatory compliance in 14 countries. Using different providers based on the country also helps address regulatory and technical challenges with international messaging delivery.

Additionally, when evaluating global scalability, consider how your message will appear to global recipients. Everbridge's multi-modal delivery optimizes voice call routing, with over 1,500 telecom operators providing local coverage in virtually all countries around the world. In addition, Everbridge offers enhanced voice call routing in more than 100 countries, which greatly increases the ability for customer-provided, local-format caller ID to be displayed correctly for the recipients. This combination has the added benefit of improving delivery and confirmation worldwide, as local recipients are more likely to engage with a message from a local number compared to one that is international.

Finally, ensure that all local data privacy, storage, and security regulations are met. Because these requirements can differ by region, and often restricts transfer of data over country borders, Everbridge can store and segregate contact information in specific data stores around the world, ensuring that it will not leave defined jurisdictional boundaries. Everbridge also guards data privacy with worldwide secure messaging with end-to-end and at-rest encryption.

Security and Compliance Certifications

Part of ensuring resiliency and scalability is being able have data available at all times. In order to do this a vendor has to obtain specific security and compliance certifications. Managing the large volumes of data necessary for critical communication is very sensitive, but necessary in order to have an effective system. Most countries have their own data privacy laws that must be adhered to, increasing the difficulty of transferring messages across borders.

It is a vendor's responsibility to protect the data within their system, and to show proof of efforts it has made to ensure this. Everbridge strives to safeguard information through the following certifications:

SSAE-16 SOC 3

The Trust Services Principles and Criteria is an international set of principles and criteria for systems and electronic commerce developed and managed jointly by the American Institute of Certified Public Accountants and the Canadian Institute of Chartered Accountants.

TRUSTe[11]

TRUSTEe verifies transparency, accountability, and choice in regards to the collection and use of personal information.

TRUSTed Websites[12]

This certification identifies companies that adhere to TRUSTe's strict online privacy principles and protects the privacy of your personal information collected through their websites, including mobile web.

TRUSTed Cloud[13]

The TRUSTed Cloud Data Privacy Certification Identifies Service Providers offering data processing services through Cloud or SaaS platforms that adhere to TRUSTe's strict online privacy principles and protect the privacy of personal information collected.

EU/US Safe Harbor[14]

According to the export.gov website, "The organizations on this list have notified the Department of Commerce that they adhere to the U.S.-EU Safe Harbor Framework developed by the Department of Commerce in coordination with the European Commission. The U.S.-EU Safe Harbor Framework provides guidance for U.S. organizations on how to provide adequate protection for personal data from the EU as required by the European Union's Directive on Data Protection."

Federal Information Security Management Act (FISMA)

FISMA requires vendors to implement and operate an extensive set of security configurations and controls. This includes documenting the management, operational, and technical processes used to secure our solutions and infrastructure throughout their life cycles as well as conducting third party assessments

To learn more about certifications visit:
http://www.everbridge.com/our-company/about-us/privacy-security-compliance/

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[11] http://privacy.truste.com/privacy-seal/Everbridge/validation?rid=68f98539-a559-42ef-a233-d628f7985e24
[12] http://www.truste.com/products-and-services/enterprise-privacy/TRUSTed-websites
[13] http://www.truste.com/products-and-services/enterprise-privacy/TRUSTed-cloud
[14] http://safeharbor.export.gov/companyinfo.aspx?id=19233

The Everbridge Solution: Resilient and Scalable

A critical communication system is an extremely valuable tool in both emergency and non-emergency situations—but only if it works as intended. Disruptions, performance degradation, or the inability to handle increased or global usage can render a system useless and increase risk during incidents, emergencies, and other events.

With global datacenters and an infrastructure unparalleled in security and reliability, the Everbridge Unified Critical Communication Platform is designed for rapid and efficient communications worldwide. Everbridge provides the ultimate flexibility in communication capabilities to meet changing needs in today's dynamic environment. The system is inherently scalable to grow with and adjust to the requirements of any organization quickly and without disruption to internal processes, infrastructure, or resources.

Everbridge ensures this resiliency and scalability on a number of levels. Built-in redundancy, including multiple NOCs, support teams, and data centers around the world, make certain that if one center is affected others can take over, without loss of performance. When needed, cloud servers can also be accessed to increase availability and scalability. If customer facilities are disrupted, users can access the SaaS system anywhere, anytime from a web enabled device.

The system can be used internationally, supporting globally located or traveling users, as Everbridge adheres to global privacy and security laws enacted to safeguard and protect contact data. User experience globally is supported through localized user interface options, and prompts and Text to Speech (TTS) in local dialects. To ensure global delivery, widespread local carrier support, dedicated local sender codes, and globally local routing improve delivery and confirmation abroad.

During large events, when local infrastructure is strained and cell bandwidth is overloaded, Everbridge ensures that your messages go through, with a combination of customized call throttling and multi-modal delivery.

The Everbridge platform is constantly tested and monitored, and conforms to stringent industry compliance standards, best practices, and certifications. No single point of performance is overlooked. For our customers, this means that you always get the right message to the right person, at the right time.

About Everbridge

Everbridge provides a unified critical communication suite that helps clients be better prepared, make better decisions, and respond quickly and confidently during disruptive events. When an incident happens, whether it's a natural disaster or an IT service outage, we automate communications to ensure that the right messages get to the right people at the right time.

Widely recognized by analysts as the market leader, Everbridge solutions are trusted by clients in all major industries and government sectors to connect with over 50 million people around the world.

THE ONLY END-TO-END PLATFORM

- **Planning**: Everbridge is easy to set up, maintain, and organize, meaning that you're always ready for a quick, coordinated response. Everbridge ensures that the right messages get to the right people - with the most advanced opt-in portal on the market, streamlined integration with internal and external data sources, and simple group and contact management.

- **Assessment**: When trouble strikes, you need rich insight, presented simply - so you can quickly assess potential impact and make an informed decision to avoid loss. Everbridge offers the only solution on the market that meets these demanding requirements, with the most advanced interactive dashboard in the industry.

- **Response**: In critical situations, ease-of-use can mean the difference between an effective response and a mistake that carries serious consequences. Everbridge is engineered to be simple to use under pressure, with a user interface that accelerates time-to-message and reduces the likelihood of errors.

- **Delivery**: Even during large-scale disruptions, Everbridge stays on. The most advanced platform in the industry ensures that you reach your contacts - every time. And with worldwide coverage and capabilities, including globally local calling infrastructure and data storage, we're ready to support you wherever your people are in the world.

Visit **www.everbridge.com** to learn more.