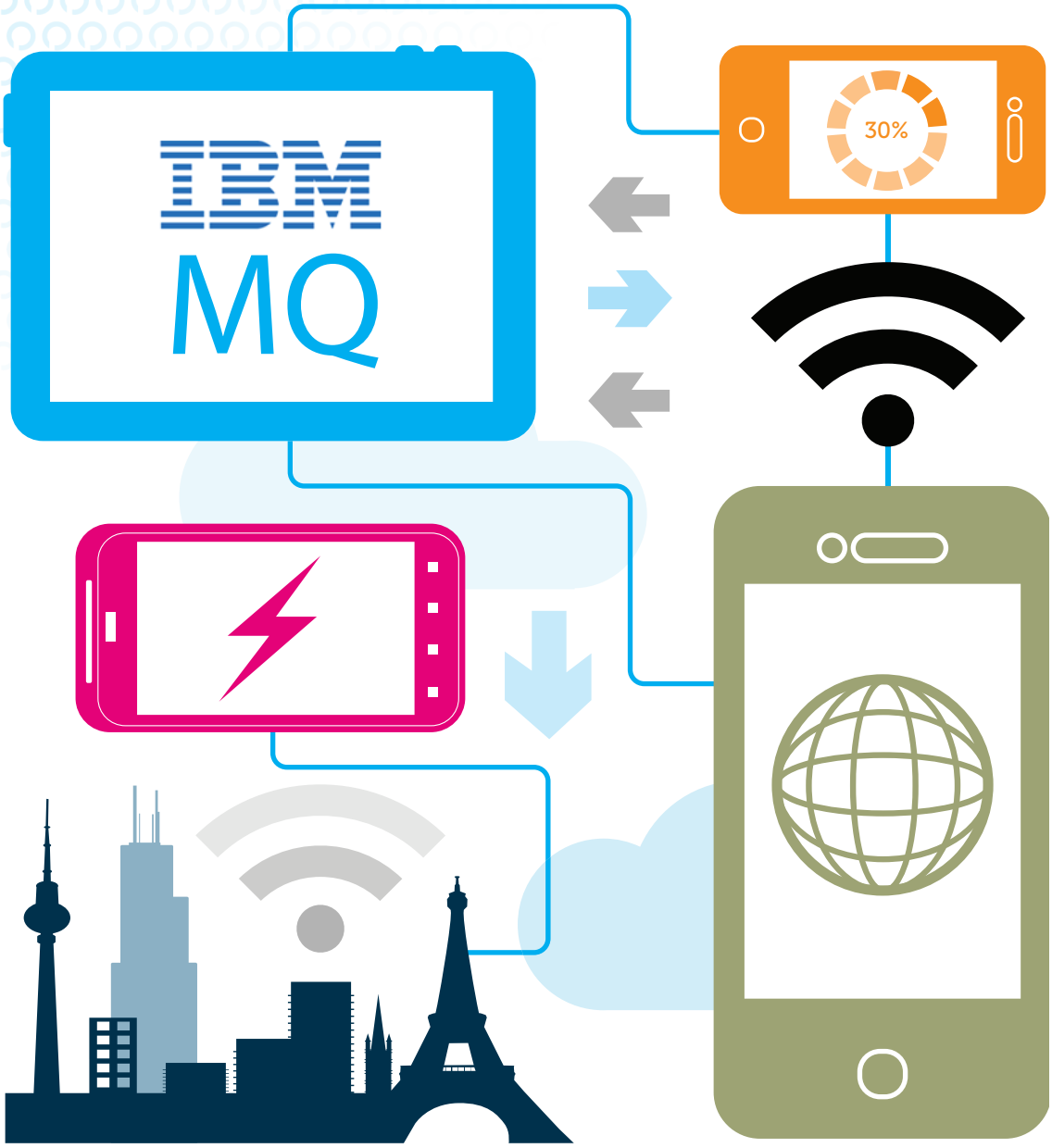
PUSH TECHNOLOGY



How to Extend the Power of IBM MQ over the Internet

Our mobile-obsessed, everything-connected world calls for connectivity over unreliable networks

Contents

Introduction

We live and work in a world of apps, and expectations have never been higher. Customers expect rich, engaging experiences on the device of their choice, in real-time, 24×7. Delivering those experiences is critical to revenue growth, customer engagement and business operations.

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For enterprise IT, this represents a significant challenge. Products like IBM MQ that, up-to-now, have provided robust, scalable and secure integration platforms for internal applications are now stretched far beyond their intended use as needs evolve. Forward-thinking organizations that understand this challenge, have begun to build upon the investments and success of their existing middleware platforms by layering on top a scalable and reactive data layer that turns Enterprise Messaging (such as MQ) into a resilient and high performance Internet Messaging service.

Diffusion from Push Technology delivers an Internet Messaging platform, that overcomes the limitations of business systems, the unknowns of the Internet, and device complexity – to stream data at extreme scale and speed, to and from millions of concurrent connections in milliseconds.

If you are in a situation where unreliable networks are an everyday part of your business and there is a need to deliver highly performant mobile and web applications at unprecedented scale, this paper will help you understand how to leverage your existing middleware investments and architect for the future.

Understanding Enterprise Messaging (And Its Limitations)

Enterprise Messaging provides an effective, loosely coupled intermediary to connect legacy systems, that would otherwise be unable to effectively talk to each other. It hides many of the details of communication from the application developer and offers a simple, common interface, without language restrictions. Simplifying interfaces allows the developer to concentrate on the business problem instead of worrying about matters such as data marshalling, inter-language operability or data movement.

Unfortunately, applying this same integration pattern for apps that run over the Internet can be challenging due to uncontrolled and unreliable connections via the Internet, and the massive number of concurrent connections required. Quite often, traditional message-oriented middleware platforms struggle to deliver data at this scale and speed without breaking the bank – or breaking the network.

The resilience and scale that MQ is known for, is measured in a very controlled environment with almost unlimited bandwidth and perhaps only thousands of concurrent connections. In reality, at scale, MQ will consume a lot of data and require a lot of hardware – and when the known network is taken away, that perceived resilience now becomes a bottleneck because it is not bandwidth conservative. Scalability is lost because the physical hardware and network cannot handle it.

The Internet redefined performance at scale and what it means – consider that MQ typically operates on a managed 10Gbps network, whereas Internet connectivity is unmanaged and probably less than 30Mbps. The Internet wasn't originally architected to move massive amounts of data in real-time, and developers now have to accommodate dozens of unknowns: How reliable is the connection? How much bandwidth is available? What happens when connections are interrupted or lost? And then there are the hundreds of combinations of devices and operating systems upon which apps are loaded.

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Extending Enterprise Messaging Outside Known Environments

Today there are one million apps in the Apple App Store and another one million plus in the Google Play Store. We are forecast to hit five billion connected 'things' by the end of next year and 25 billion – or three for every person on the planet – by the end of 2020[1].

The migration of users to apps and devices has significantly impacted businesses, forcing the use of messaging solutions. Since the boom of the Internet and the launch of the smartphone in 2007, web and mobile applications have become fundamental to engaging customers and supporting business processes.

Expectations for these applications are ever-increasing. We want to do more with apps, particularly on mobile devices, and we want full functionality – regardless of the device we use or connection we have. Mobile application performance has become the most important differentiator when it comes to customer adoption and retention. Research shows that the number one complaint from consumers and employees is the speed of applications. To combat this, many applications provide limited information to users and often sacrifice functionality by doing so.

What is your Dream App?:

eGaming – Sports betting

A sports betting organization wants to provide odds to 2 million unique users using mobile products, as well as over 54 million webpage views – all delivered instantly for in-play betting. It then wants to receive placed bets – instantly. All without device discrimination on networks ranging from 4G, 3G, Edge and GPRS.

Second Screen – Mass Audience Live Show Participation

A broadcaster wants to give end users the ability to vote and engage with a live show via second screen (the use of a second device while watching TV) to millions of concurrently connected users. Revenue opportunities come from various sources – advertising and voting – but also in keeping that person engaged with the show and the knock-on effect for ratings.

Healthcare – Data Saves Lives

There is an increase in the number of IP-enabled devices within healthcare to help the monitoring and distribution of sensitive patient data. However, the issue of how to get data to those devices and enable them to share this data has not been addressed. Providing this capability has proven daunting as the availability of wireless in hospitals, connectivity at scale and security concerns all have proven to be too large to address.

Retail – Targeted Advertising

Retailers are becoming more focused on providing targeted advertising to customers. This helps the customer feel that the retailer is more personalized to them, while it saves the retailer considerable amounts of capital on advertising. However, without constant, real-time data, retailers can miss critical moments to capture customers. Imagine the ability to snag customers that are travelling past a storefront with a tempting voucher. Or providing flash sales that will cause hesitant customers to purchase products and services. The ability to provide concise and targeted advertising in a real-time fashion could offer a competitive edge, but this requires that data from the consumer is received, processed, understood, and responded to in near real-time.

[1] ZDNet, 25 billion connected devices by 2020 to build the Internet of Things, November 2014

Staying Connected in Our Mobile-Obsessed, Everything-Connected World

With smartphone adoption on a dramatic rise, and The Internet of Things (IoT) becoming a reality, we now live in an ever-connected world. Applications for these devices no longer exist only locally, they are constantly using the network to provide ads, data or information to the consumer. With so much load on the network, and more and more applications using it, every application must now struggle to get a small slice of available bandwidth. The latency associated with that data being driven to or from the application is dependent on several factors, including but not limited to:

- The speed and quality of the network
- The load on the network
- The time to send the data to backend servers
- The load on the backend servers receiving the data
- The time to process/distribute/store that data on the backend
- The time it takes for the data to return to the device
- The quantity of data sent

The problem is that the network is what it is – a finite resource that cannot be controlled. You cannot really do anything about the network. The question is therefore, how can organizations extend messaging to end users, reliably, outside the firewall, in the world of unknowns?

Enter Internet Messaging

As we've discussed, Information is no longer static, or from a single source. It doesn't stay just within the safety of the enterprise, instead, it spans the Internet to reach hundreds of thousands or millions of users. This new ecosystem has defined a new need, Internet Messaging. We have therefore defined Internet Messaging as high-throughput, low-latency, bandwidth-conservative data movement between vast numbers of endpoints that are casually connected via the Internet. Like Enterprise Messaging, Internet Messaging was born from the need for systems and apps to exchange information and data. Unlike Enterprise Messaging, which handles data traffic across a dedicated and known network, Internet Messaging must deal with all the unknowns of the Internet.

Internet Messaging is a high-throughput, low-latency, bandwidth-conservative data movement between vast numbers of endpoints that are casually connected via the Internet.

To address the many needs described above, middleware needs a more modern, data-centric approach. We believe that successful modern messaging requires Internet Messaging, with an emphasis on Internet Sympathy – the ability to be sympathetic to the realities of mobile devices and the fact that people are often on the go. As these users move around with these devices, the connectivity will change between EDGE/3G/4G/WiFi, causing (at times) vast fluctuations in performance of mobile devices.

By combining the power of IBM MQ (Enterprise Messaging) with Internet Messaging, data can quickly flow to all devices, no matter if they are within the dedicated Enterprise or connected via the Internet.

First and foremost, users need to continuously monitor and track the unknowns of the Internet:

- The speed of the Internet connection
- The reliability of the connection
- The available network bandwidth
- The device, operating system, browser, and application version the data is being sent to or being pulled from
- Network congestion
- Overloaded clients
- Overloaded servers

Armed with this information, companies can then select the fastest possible transport protocol supported by the client, adapting as the connection changes. This helps to manage the session "state" and to automatically reconnect lost connections.

A Checklist for Messaging Over the Internet

IBM MQ users need high-throughput, low-latency, bandwidth-conservative data movement between vast numbers of endpoints connected via the Internet.

Breaking this down, what does it mean?

- High-throughput means we need to support lots and lots of updates in an event-driven, streaming fashion.
- Low-latency means that speed is king, and we need to get the data there quickly. No user, CTO, CIO or CEO will ever say their site is "too fast" and must "slow down."
- Bandwidth-conservative drives us to care about every byte we send, being conscious of users' data plans.
- Data encompasses any information, facts, figures, streams or other ones and zeros we might need to move.
- Movement implies bi-directional, it's necessary to collect statistical data while providing information to consumers.
- Finally, a vast number of endpoints does not mean hundreds or thousands, it means tens or hundreds of thousands of users, growing to millions of users, all connected concurrently over the Internet.

Out of this, we can generate a checklist to be used when looking at any product that claims to be Internet Messaging, to see if we can apply the term. On our checklist, we now have:

☑ High-throughput

Every developer faces a significant throughput problem in the coming years. With IoT bringing 50 billion plus devices by 2020, there will be more data than ever to move across devices.

☑ Low-latency

No business is ever fully happy with how fast their site or app is. User preferences for instant data gratification are so strong that apps are uninstalled if they make users wait more than a few seconds. Speed is king, and real-time data is not the new norm, it is the new expected.

☑ Bandwidth-conserving

No user wants to pay more for their cell phone bill every month, and no company wants to pay more for increasing bandwidth. Bandwidth is not free or infinite, especially as we move to a service-orientated model in the cloud. The scaling criteria of the near future will not just be CPU and memory load, but will also be based on network load. ***Savings of just 2 bytes per message to 50,000 users receiving 10 messages per second results in a savings of 31.5 TB over the course of a single year.*** Don't forget that as bandwidth is measured in bits per second, the fewer bits we try to send, the faster we can get them to their destination and the more streams we can support.

☑ Vast scale, without degraded Quality of Service (QoS)

Most services that are built to handle load have a common feature, the connection vs latency graphs are exponential functions. In other words, as the number of connections increases, the latency of each connection increases exponentially, causing all users to slow down. In a world of mobile devices and constantly changing network conditions, focusing on constant QoS at scale will enable larger numbers of concurrent connections on a single machine, allowing companies to easily handle spikes in user demand while reducing infrastructure demand.

☑ Internet Sympathy

Contrary to its name, Internet Sympathy is not a greeting card. Internet Sympathy is about being sympathetic to the realities of mobile devices and the fact that people are often on the go. As these users move around with these devices, the connectivity will change between Edge/3G/4G/WiFi, causing (at times) vast fluctuations in performance of mobile devices. As IoT enters the picture, this introduces even more unreliable connections, requiring developers to focus on Internet Sympathy.

With this checklist in hand, developers can be empowered to choose an Internet Messaging provider that solves their needs and lets them focus on what they do best: building cool apps.

The Magic Happens in the Middle

Fundamentally, MQ focuses on moving data around the enterprise. Diffusion is about ensuring that same data can be efficiently distributed across the Internet. For IBM MQ users, the ability to intelligently stream data in an environment that has so many unknowns is vital. This middle piece is where breakout moves are required when companies who utilize the investment in IBM MQ begin to move beyond the edge of their enterprise, and reach into the web, mobile or IoT markets.

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Historically, web applications were designed to fetch data from backend systems when requested by the user or at some pre-defined point in time. This "request/response" approach often stretches networks and enterprise applications to their limits, resulting in a poor user experience: the veritable "spinning wheel of death." Because of the limitations of the request/response model, some companies – including Push Technology – have moved to a publish/subscribe model. Push Technology, however, has advanced the publish/subscribe model to a whole new level, one that is demonstrably better than standard publish/subscribe models.

Push Technology has also taken a fundamentally different approach to streaming data.

Push Technology has also taken a fundamentally different approach to streaming data. To maximize performance, it combines the advanced capabilities of a publish/subscribe model with a live data model that takes continuous snapshots of the data in business systems and caches it within a Reactive Data Layer. This eliminates the performance drag of reaching into business systems each and every time applications need data.

What is a Reactive Data Layer?

A Reactive Data Layer (RDL) normalizes data from all systems and cloud applications to provide a single, live data model that abstracts the transmission of data between the RDL and consumers or producers. In the modern world, applications do not adhere to a typical client-server model – instead reactive applications are both consuming and producing data across multiple endpoints, at the same time.

In addition, Push Technology focuses on only sending messages when data has changed rather than redelivering whole datasets like other systems, including Enterprise Messaging, do. Focusing on this type of data delivery keeps costs under control while still providing a highly scalable and bandwidth-efficient solution. To ensure the best possible experience for every end user, close attention is paid to the capabilities of the devices running business applications and the networks over which the data is sent.

Give Your Data-Intensive Apps a Performance Edge

Diffusion from Push Technology gives your data-intensive apps a performance edge – it's like dropping a turbocharged engine into your Internet-connected devices. That horsepower gives your Internet apps the ability to handle the extremes of data delivery over the Internet:

Extreme data management

The more data businesses have and the more that data changes, the more they benefit from Push products. The advanced publish/subscribe model lets businesses organize data in an intuitive, hierarchical structure based on data topics and subtopics much like files, folders and sub-folders organize content on a computer.

Extreme quality of service

The level of service Push delivers to optimize how business apps run over the Internet is unmatched. A live, continuously updated data model replicates your databases and caches the data at the edge of the Internet – eliminating the performance drag that happens when each application has to continuously reach back into core business systems and databases. Continuous network monitoring – and adjustments – help businesses avoid the roadblocks that can stall data movement and the reliable delivery of data. Think of it as having a personal "air traffic controller" for the data streaming between business systems and their corresponding web and mobile apps.

Extreme scale and speed

15 million messages per second to 87,000 concurrent connections is typical of Push products although we have pushed the boundaries in scale to millions of concurrent connections without sacrificing performance. Another way to look at this is that a single Push server or a single Push instance in the cloud can process as much as a competitor's entire messaging infrastructure.

888 Follows Its Dream

888 Holdings PLC (888) is one of the world's most popular online gaming entertainment and solutions providers. At the forefront of the online gaming industry for over a decade, 888, and its B2B arm Dragonfish, allow both players and B2B partners to enjoy a world-class gaming experience.

888 is expanding rapidly in new markets, offering new gaming entertainment all while complying with different regulatory requirements. To support this growth, 888 turned to Push Technology – and its partner IBM – to further extend its powerful gaming experience.

Innovative companies like 888, are always looking for an edge in today's mobile-obsessed, app-loving, everything connected world, and recognize two fundamental things:

1. Data is key. What apps really care about is the structure of the data, how it changes, which bits are important and which are less so. And what do customers care about? They care about the "now" and experiences that are as close to instant as possible.
2. Since everyone is using the same network (i.e. the Internet) to exchange data, the company that overcomes the Internet's many obstacles wins.

The Internet without Trade-Offs

888 is one just one example of a market leader using Push Technology's implementation of a Reactive Data Layer to turbocharge applications that run over the Internet. With Push Technology, customers stream data to and from tens of thousands – even millions – of devices. And this is done without breaking the bank or breaking the network

Conclusion

At Push Technology, we deliver extreme scale and speed and easily complement existing Enterprise Messaging platforms like IBM MQ.

MQ users wanting to extend the power of messaging across the world of Internet unknowns need the ability to harness Internet Messaging. In summation, Push Technology combined with IBM MQ gives a competitive edge to deliver extreme data management, extreme quality of service and extreme scale and speed, helping businesses fix problem apps and deliver dream apps.

About Push Technology

We make the Internet work for our mobile-obsessed, everything-connected world. Leading brands like 888 Holdings, DAB Bank, Sporting Bet, Betfair and William Hill create Push Data Networks to power applications critical to revenue growth, customer engagement, and business operations. Deploy our enterprise-class technology the way that makes sense for your business: on premise, hosted, or in the cloud. Now you can deliver apps at scale and speed (and lower costs) and give your IT staff their weekends back. Learn how to fix your problem apps and bring your dream apps to life at www.pushtechnology.com

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