New technology, new risks: Digital security for financial services

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Digital security: is your house in order?

Dangers are everywhere: stolen data, systems held to ransom, pilfered payments, even fines for not sticking to the rules.

Security has the power to make or break your digital transformation. It's the number one enabler, letting you run at speed and helping you build customer trust and investor confidence. The flip side is that poor security will undermine your plans for a digital future.

We live in a world where technology is all-pervasive. But as businesses roll out ever more sophisticated and ambitious digital strategies, criminals are seizing the opportunity to exploit vulnerable systems and slack security processes.

Their attacks are supported by a vast, well-resourced, and hugely profitable black market in attack tools. A recent example is the rise in Ransomware-as-a-Service (RaaS), often bought by criminals without the skills to restore your files, but who will take your money nonetheless.

Digital risk and digital opportunity are two sides of the same coin. Build security into your digital strategy and – if you get it right – you'll improve your customer experience. It doesn't matter whether you're moving to the cloud or bringing in a mobile workforce; whatever your digital transformation looks like, you'll need watertight security to make a success of it.

For the financial services sector, some of the key threats to watch out for include:

- Insider threats through employees inadvertently falling for email-based phishing scams.
- Attacks on Internet of Things (IoT) devices and platforms.
- New mobile payment methods, which may have unknown vulnerabilities.

Financial services rely on trust. More and more, customers allow financial service providers to collect personal data in exchange for the benefits of a personalised experience. There's a great opportunity for financial service companies to differentiate themselves by offering the most secure service on the market.

But it's not just 'your' security that you need to be worried about. You should also be questioning how secure your suppliers' IT systems are, as well as working out how to counter the increasing vulnerabilities around IoT and multiple-IP devices.

In this paper we'll explore the security risks that come with being a financial services provider in a world where being digital is no longer an option: it's a necessity for business survival.

We'll share our views on some of the new risks CIOs and CSOs need to be aware of, technologies like blockchain and biometric identity verification, and we'll help you plot a route through the digital security minefield.

"92% of companies see digital as a security opportunity and 73% say digital security is on the board agenda.[1]"

General Data Protection Regulation (GDPR)

In May 2018, GDPR became law. From that date, companies have to show that they've designed data protection into their business processes. GDPR demands that companies demonstrate they have the necessary capability and controls in place to protect personal data.

Managing your security risk is never finished. There is no end-point, where you can rest easy and assume that all is safe. Attackers constantly change their methods so it's a continual process. Businesses must address upfront all security and privacy questions around any new initiative and ensure they keep the answers current. Unfortunately, many companies still struggle with this idea.

Payment Card Industry Data Security Standards (PCI-DSS)

PCI-DSS protect customer card information and prevent agent fraud. Any merchant dealing with card details must meet these standards, with the bar on meeting them rising. It's crucial that all agents and systems that routinely use card data stick to the regulations.

PCI-DSS compliance is a complex, on-going process that can be both time consuming and expensive, and can sometimes limit business agility. However, not sticking to these standards could damage your reputation, credibility, customer loyalty, and expose you to legal issues.

Changing security risks within the financial services sector

Financial services providers are on the frontline of finance. They need to be at the forefront of tech changes, too.

Digital disruption and financial services

From a digital perspective, the financial services sector is in a state of fundamental change. As the market becomes more complex, financial services providers need to think fast and be ever-ready to adapt to changes. But one thing is constant: the need to embed security into every decision you make.

Four technologies in particular are bringing new risks that you can't ignore:

1. Blockchain
2. New payment methods
3. Biometric identity verification
4. Internet of Things (IoT)

1. Blockchain

Blockchain is a technology that records internet transactions on the network and distributes the time-stamped data on nodes across the internet. It's essentially a shared, trusted, public ledger.

As with many new technologies, the jury is still out on the long-term role of blockchain but the financial services sector has been quick to exploit its potential, which already includes: cross-border trading and settlement, retail (mortgage applications, person-to-person payments), currency exchange, supply chain, compliance, and insurance.

The compelling attraction of blockchain is that it presents a single truth. No-one can alter the data because any transactions that are out of sequence are immediately visible, and all records are secured by encryption and hashing.

Blockchain security

But blockchain does have a weakness: lack of regulation.

This absence of legislation is the main stumbling block to blockchain adoption. There's no backing or guarantee, and no way to identify, document, and recover potential losses arising from cyber-attacks or other criminal activity.

Specific risks and security considerations depend on how blockchain is used. As these new methods are still in fairly unknown territory, so are the security risks.

In 2015 Interpol demonstrated a form of malware that potentially allowed the blockchain underlying Bitcoin to be undermined[2], letting new and unrelated data into the blockchain.

Researchers from the University of Newcastle have run trials introducing a botnet command and control mechanism to send messages to bots on the Bitcoin network. Because blockchain doesn't allow records to be edited, once the data's polluted there's no easy way to fix it.

And even if the falsified records could be identified, accountability and liability would be a challenge given the distributed nature of the processing: users are anonymous (and even if they weren't it would be hard to prosecute them as regulations and legislation are still lagging behind).

While institutions are rapidly playing catch-up to understand and address blockchain, many companies, including IBM and Intel, are taking an active stake in developing standards and regulations.

For example, the Hyperledger blockchain and the R3 CEV banking consortium are advancing standards and regulations; and Toyota Financial Services are exploring smart contracts for the sale of cars.

Others are setting up their own teams and incubators to develop ideas, ranging from the support of existing blockchains (witness JP Morgan Chase using Ethereum for their Quorum initiative) to the creation of their own blockchain systems (the R3 CEV consortium).

Goldman Sachs are even creating their own virtual currency, SETLcoin.

Recommendations for blockchain

Thinking about blockchain? That's fine, your competitors are undoubtedly doing the same. But exercise caution.

While, in principle, blockchain is extremely secure, you need to pay extra attention to your cyber security before you can be confident that you're watertight. Look at where you would store your private keys, how you would use them, and how you would confirm transactions.

And that's before you get to some basic practicalities: how do you actually switch to blockchain, which fundamentally changes how you do business? The consequences for your organisation will be far-reaching so you better be sure that you know where you're going and how you're going to get there.

With blockchain still being in its infancy, it's a fair bet that there are security issues lurking out there waiting to be discovered. Before you jump in with both feet, maybe run a pilot project to help assess whether the benefits outrun the risks and costs, join an existing corporate blockchain partnership, or collaborate with a fintech.

But take care to consider your due diligence process: for example, do some penetration testing and discover any vulnerabilities before entering into an arrangement, and set up a policy for blockchain security and incidents.

2. New payment methods

With the rise of new and nimble fintech companies, there have been rapid developments in payment technology. Sure, these innovations lead to an increase in convenience, accessibility and speed, but they also bring new risks. How you identify and deal with these risks should be a prominent component of your security strategy.

There are currently many different methods at various stages of maturity:

- Digital wallets (PayPal, Google Wallet).
- Mobile wallets (Android Pay, Apple Pay).
- Mobile credit card payments (card readers with mobile app).
- P2P mobile payments.
- Wireless card payments in supermarkets, hotels, restaurants, vending machines, and so on.
- Connected cars that make the car a payment device to allow pay-at-pump, pay-at-drive-through, remote order/pick-up, and payment for parking meters.

Payment methods security

It's an unpalatable truth that digital transactions are even more attractive to criminals than they are to law-abiding customers. The potential anonymity of mobile and internet payments, with no face-to-face contact involved, make them juicy targets for fraudsters. Identity is difficult to verify, transactions tricky to trace.

There are other risks, too, all compounded by the frequency of transactions: incomplete or fabricated information, structured or recurring non-reportable transactions, and the ability to reload.

Although these problems are not all new, the speed and scale of criminal activity is. In general, the more international the payment method (i.e. the less geographical restrictions on use), the larger the risk – especially if transactions happen in places with a high risk of money laundering or terrorist financing[2].

And if there's limited control on user activity and user identity, especially when combined with high frequencies, then the risk keeps on increasing. The potential for fraud and other criminal mischief increases when:

a) Value-transfers are possible between two unrelated individuals online,

b) There is no maximum load value,

c) There is no expiry date for the service.

Luckily, there are also new ways of verifying the identity of the customer, making it easier to manage and mitigate the risk.

As well as the security still needing development in some cases, the newness of these technologies means that there are still a few regulatory gaps. As fintech-related advances are often based on a decentralized model (instead of nodes in the system, which is what regulators are typically familiar with), they're generally tricky to regulate.

Recommendations

To mitigate some of the risks of new payments technology, there are some basics to consider:

Think about placing limits on funding, specifying the parties and methods authorised to fund the accounts, and stipulating the legal tender that people can use.

If your risks are high, you might want to tighten your identity verification process. Screen customers before they make any payments: name and address, date of birth, phone number, where they're making the payment from. If you don't know this stuff, how can you be sure that they're legit?

When you're working with a third party, one thing is paramount: segregation of your network.

You must make sure that your sensitive data is not inadvertently available to unauthorised people. So always run due diligence on any third parties you're involved with. Check that they stick to the same (international) standards as you do, find out where they're based, and confirm that you have clear lines of accountability and oversight.

Transaction monitoring is useful here. Track and record transaction frequency, value, volume, and location (are you seeing customers appearing in high-risk countries?) so you can identify unusual transactions and take appropriate action swiftly.

And finally, regulations. Don't just wait to be told what you have to do, help create the regulations by proactively approaching the regulatory bodies. Yes, it's good for compliance but it'll also help you steal a march on your competitors.

3. Biometric identity verification

Biometric security is the user-friendly way to tighten security.

Of course, the main characteristic of biometrics is that they're stable and shouldn't change significantly over time. Think fingerprint scans, iris and retina scans, vein and vascular patterns.

There are also solutions that use behavioural traits like voice recognition, computer mouse signature (shape, speed, pressure, timing), gait recognition (how you walk – currently at an experimental stage), and keystroke dynamics (speed and timing).

Biometric identity security implications

Biometric verification is an attractive option for the financial services sector: many of the problems caused by buyer anonymity just disappear.

Scanners at ATMs could reduce fraud; biometric technology can simplify online and mobile banking; and, for people who struggle to use chip and PIN systems, buying things on the high street becomes a lot less irksome.

Unfortunately, some of these new techniques aren't invulnerable yet and need more development.

For example, the voice recognition software for HSBC was 'hacked' by a twin to copy his brother's voice[3], and Samsung's Galaxy S8 iris scan[4] was fooled by just printing out a picture of the iris in question and holding it behind a contact lens. Still, it's possible these are just teething problems on the road towards a more secure (and convenient) future.

Another consideration is the privacy and storage of biometric data.

Anyone implementing this type of system needs to think about who has access to that database, how they access it, what security is in place to avoid it being hacked into, and how users feel about handing over their biometric data and having it stored centrally.

Luckily there are some techniques available to you, like biometric cryptosystems (matching takes place in an encrypted domain), private or cancellable biometrics (one-way transformation only), differential privacy systems (biometric data and personal information are always stored separately), and smart-card secured templates.

With smart-card secured templates, control is handed over to the card holder, removing the uncertainty of matching via a network-connected device, an external server, or a database.

There are methods in development that associate a digital identity to an individual while using a token that doesn't store any data at all (and is therefore useless when lost).

This works by programming a token to recognise your biometric data and generate a unique key, which is then sent to the server to interface with the current authentication portal. Because there is no actual physical data stored, your identity is secure while still allowing the other party to verify that it's really you on the other side.

Although these methods are – for the moment – costly, they're developing rapidly and promise a future where there's no longer a trade-off between security, privacy, and ease-of-use.

Recommendations for biometric technology

Although biometric identity promises clear benefits over traditional usernames and passwords, until the accuracy of biometric technologies can be guaranteed, it's important to have alternatives.

We recommend that you take a blended approach, where traditional, multi-factor and biometric verification support each other in tandem.

When it comes to identity verification, there are two factors that you need to balance. How you do this depends on your appetite for risk.

1. FAR (False Acceptance Rate), which gives opportunity for fraud but is convenient for customers

2. FRR (False Rejection Rate), which is very secure but is more inconvenient for customers

It boils down to one question: how much fraud are you prepared to accept in order to reduce customers being frustrated when they're falsely rejected?

Look at adopting biometrics as a long-term strategy rather than a short-term upgrade and think hard about the cost. Does your level of risk justify the cost or are you better off accepting a low-level of fraud?

4. Internet of Things (IoT)

The Internet of Things (IoT) is where everything is connected to the internet: homes, cars, people, even smart cities. The potential for all sectors is huge. In the financial services industry, think ATMs, information kiosks in bank locations, and cards that use sensing technology to monitor and take action on behalf of the customer. And that's just for starters.

Beyond cost savings, businesses are beginning to tap into the IoT for new revenue models, often from the products, platforms, and services that enable it. Take insurance companies, for example.

You can already get usage-based insurance. An in-car sensor captures data about your driving performance when you're at the wheel. You activate the sensor through a mobile app whenever you want to drive the car. The insurance company can charge preferential premiums for good drivers and penalise those that drive badly.

The security of these in-car devices is critical. Both the insurer and driver must be confident that the captured data is accurate and complete. For instance, San Francisco-based insurance start-up Metromile found that its plug-in devices could be used to hack into a car's braking system. Thankfully, they've now fixed that problem.

The impacts of IoT on insurance aren't just limited to the motor trade. Life, health, homeowners, and commercial insurance are all in line for an IoT makeover. And, of course, it's not just insurance. Make no mistake, the IoT will affect everything.

Internet of Things security implications

Regardless of how they're used, many organisations are deploying IoT devices without proper security measures.

This shortcoming is, in part, because many vehicles, shop-floor equipment, and other increasingly IoT-enabled devices were not built with internet connectivity (or security measures) in mind. The IoT attack surface is magnified by scale, distribution, and the broad spectrum of IoT endpoints, from the very simple to the highly sophisticated. It's possible that some of these devices are not even being monitored, let alone secured.

Many IoT deployments will require real-time analysis and response, which needs automated processes that have little or no human involvement.

You don't need a sophisticated security set-up to prevent potential attackers using the IoT to hack into your business: you can make life harder for them by checking a few basics –

Make sure you only use IoT devices you can reset to the original factory settings.

- Disable default passwords and replace with your own, unique and secure versions.
- Exclude any ancillary services on the device that you don't actually need.
- Exclude the possibility of backdoors into the device.
- Make sure you can get hold of all of the device support materials – online manuals, updated instructions, and helpdesk contact details.
- Every network-connected device must be accessible by the manufacturer or software vendor so they can update the software and firmware (software-over-the-air/SOTA and firmware-over-the-air/FOTA) – ideally, the updating process will be automated but be subject to cryptographic checks to verify that the updates are on the level.
- Stick a label on each device so you can easily identify it within your portfolio of devices and add a note covering basic support info.

These measures will strengthen the defence of your IT perimeter, leaving you to focus on the prevention of more sophisticated attacks.

Regulations: do you know what's going on?

2018 is the year of the GDPR and PSD2. If you're not up to speed, your business could be in jeopardy.

GDPR and PSD2

There are too many regulations covering financial services companies for us to discuss here. But there are two new ones heading your way that you need to be acutely aware of.

General Data Protection Regulation (GDPR) and the Payment Services Directive 2 (PSD2) are two far-reaching regulations that'll affect most financial service companies in 2018.

General Data Protection Regulation (GDPR)

GDPR became law in May 2018. Covering all automated processing and all processing of personal data, which forms or is intended to form part of a filing system, GDPR applies to any organisation –

- with an 'establishment' within the EU, whether processing takes place within the EU or not
- that offers goods or services to people in the EU
- that monitors people in the EU

Failure to comply with the regulations can land you in very hot water.

You have to report any breach within 72 hours. A two-tiered sanctions regime could lead to fines of up to €20 million or 4 per cent of global annual turnover for the preceding financial year (whichever is the greater).

For other breaches, the authorities could impose fines on companies of up to €10m or 2 per cent of global annual turnover, again whichever is greater.

In order to not fall behind (and face the considerable penalties), companies should ask themselves:

- Are all your decision makers aware of GDPR's impact?
- Are you certain that you're aware of all personal data you hold and how you gather it?
- Are you absolutely sure that you should be holding the personal data that you have?
- Do you have the procedures in place to detect, report, and investigate a data breach?
- Have you designated a Data Protection Officer?
- Are you aware of how personal data travels across your business?

Being able to answer these questions won't just help you stay out of regulatory trouble; it'll help strengthen the trust between you and your customers.

Payment Services Directive 2 (PSD2)
The Payment Services Directive 2 (PSD2) came into force on 13 January 2018.

Designed to increase customer protection, the PSD2 will also increase competition and innovation in the payment services market.

It's essentially about third party access to customers' online accounts and payment services. The regulation requires banks to give third parties secure, regulated access to customer accounts in the same way as if the customer had given their explicit permission for the access.

To do this, banks must use customer identity verification and authentication through Application Programming Interfaces (APIs).

This opens the way for two new types of service (regulated under PSD2) –

1. Prohibit surcharging, which are additional charges for payments with consumer credit or debit cards, both in shops or online;

2. Open the EU payment market to companies offering payment services, based on them gaining access to information about the payment account;

3. Introduce strict security requirements for electronic payments and for the protection of consumers' financial data;

4. Enhance consumers' rights in numerous areas. These include reducing the liability for non-authorised payments and introducing an unconditional ("no questions asked") refund right for direct debits in euro.

Even though PSD2 has already become law, it's possible it has not visibly affected you yet. However, we recommend approaching this regulation proactively:

- How does this affect your business strategy?
- Can you start experimenting now to test your thinking, and maybe even discover any faults before they harm your company?
- Is your infrastructure prepared for the use of open APIs (even if the definitive technical standards are still a work-in-progress)?

Consider how this regulation affects you and investigate how responding to the new regulatory landscape quicker than your competitors might benefit you in the long run.

Embedding security as good practice

A practical guide to addressing the challenges.

Don't skip the basics

Many financial service providers try to implement the latest security tools to protect themselves against sophisticated attacks. However, many attacks these days still focus on existing hardware and software vulnerabilities.

Here's where the digital security opportunity lies.

1. Protect what matters most – your data.
2. Harness big data - security, network, and user devices produce vast quantities of data. You need to rapidly make sense of it in real-time to detect and prevent internal and external threats.
3. Comply with regulation – look at your entire security landscape, because it underpins your efforts to comply and protect data.

You can eliminate a large part of the threat by applying some simple best practice to the way you manage security.

For example, at BT we have a dedicated security policy across our business, with centralised patch control and device management[5].

But good practice isn't just about technology, you need to create a distinction between the technical requirements and the people and process considerations.

Technical considerations

- Do you have an inventory of all authorised devices, so you can block unauthorised ones?
- Are you in control of all the software that people use in your business?
- Do you use anti-virus, anti-spyware, and anti-malware programmes, and are they (consistently) up-to-date?
- Is your data encrypted properly, both in transit and at rest?

People and process considerations

Even though you'll have trained your employees to handle personal data and they'll no doubt be up to speed about GDPR, PSD2, and all that regulation malarkey, they're still a major weakness in your security set up.

The 'inadvertent actor', insiders that make mistakes or don't stick to processes and policies, are often the catalyst for cyber-attacks. It's no good having a gleaming security policy if people don't fully understand it or can't be bothered to follow every last rule.

- Do you monitor user activity, especially privileged users?
- Have you defined clear security roles, responsibilities, and permissions for each employee?
- What kind of training and communications do you have in place to educate your staff?
- Do you conduct penetration tests/ethical hacking to check that your employees are sticking to your security policy?

Although many organisations will be familiar with these actions, we know that not everyone is doing it. If they were, we wouldn't see organisations succumbing to attacks such as WannaCry, which could have been avoided if the victims had taken a few simple precautions.

But where should we start?

The security landscape for financial service companies can seem so complex that it may be difficult to know where to start.

At BT, we have over 70 years' experience in cyber security, employing more than 2500 security personnel across 15 security operating centres globally. Based on our experience we recommend you start by taking the following steps:

1. Identity your 'Crown Jewels'

Start by identifying your top business assets, the ones that are critical to the successful running of your business.

This might include technology assets like WANs, LANs, and computers, physical assets like specific buildings, and human assets such as high-value individuals or privileged users like system administrators and database administrators.

It doesn't matter how many you have on your list – just make sure you think about everything that would stop your business working if it wasn't there.

Once you have your list, see if you can answer these questions:

- What is your most important infrastructure, information, human asset and why?
- What are your most critical applications and what do you do to test and check them?
- What are you monitoring proactively, how do you baseline 'normal', and

what do you do when you pick up an abnormality?

- What Distributed Denial of Service (DDOS) protection do you have in place?
- Do you audit or control the access your partners and third parties have to your critical data?

2. Carry out a risk analysis

- Review all risks and vulnerabilities across the threat landscape. Do a gap analysis, and write a tactical plan to address the most pressing needs.
- Get somebody independent to undertake ethical hacking, e.g. code reviews, penetration testing, red team and social engineering, firewall and host configuration reviews, and network testing (both fixed and mobile).

3. Address the gaps

- Review your processes and identify whether they are actually being applied in your organisation.
- Don't buy lots of new technology, optimise what you have first (some companies are buying advanced big data analytics, but not carrying out basic virus patching).

Keep rethinking the risks, undertake horizon scanning for new threats, be proactive not reactive.

4. Get to grips with big data

The increasing sophistication and tenacity of cyber criminals mean that no organisation can be 100 per cent confident that its systems are secure. But you can take steps to make successful attacks more difficult, more costly, and ultimately much less lucrative.

Harnessing big data by applying threat intelligence tools can bring many positives for security: identifying attackers before they hit; finding previously unknown attacks; spotting in-progress attacks quicker; and helping to understand the impact of a successful attack.

Data analysis and visualisation tools are based on intelligent and self-organising software algorithms, and are applicable to structured and unstructured data feeds. They radically simplify the analysis of complex associations, and enable you to interact with, and enhance, the data during the analysis process.

To get big results from your big data, you need to get a couple of basics right from the kick-off:

1. Make sure you're collecting all the relevant data you need: people, process, and technology all need to be taken into account. Stealthier (and more persistent) attacks require more data to uncover.
2. Use visual analysis tools to make sense of this mountain of data. By turning threat data into threat intelligence, you'll learn and improve (something that is increasingly demanded by the regulatory authorities).

One way to collect the kind of data you want – while excluding the risk of false positives – is to employ honeypot software, which attracts would-be attackers to systems likely to be of interest (like the computers of executives, and central servers that control user access).

The use of big data and threat intelligence tools can give you a definite edge in the arms race between cybersecurity and cyber-attackers.

"48% of companies find it somewhat difficult, and 26% find it very difficult, to assess the quality of threat intelligence feeds.[6]"

Conclusion

Looking forward, the implications of cyber-attacks for financial service providers will become more serious. The pressure will not tail off. The volume of attacks continues to grow, criminals will exploit soft targets and share intelligence on them with their nefarious peers.

With the increased regulation of GDPR, there will be significant fines for businesses failing to protect the personal data of any EU citizen. The role of the CIO will change because of the additional pressure of monetary consequences, and demand for CSOs may rise as CIOs look to share the burden.

If there's only one thing that you take from this paper, make it this: get your basic housekeeping right.

And that means people, processes, technology, and threat intelligence tools need to be constantly ready for the next threat. Remember, cyber security is a process without an end-point. It never stops.

The opportunity for financial service providers lies in keeping up with the dynamic market and its players, but doing so responsibly. It is now possible to combine the best of online and instore to create a joined-up customer experience. New payment, authentication, and IoT technologies will only enrich the customer experience if they are implemented securely.

We're uniquely placed to help you on this journey. We recognise that, although our customers often need to address a number of common challenges, in practice individual circumstances mean that a 'one size fits all' approach does not work for cyber security.

Our approach, firmly based on industry best practices, is to tailor our capabilities to the individual customer's requirements. We draw upon our in-depth knowledge of prevailing regulation, vertical market requirements, and experience in implementing complex solutions.

We can help you:

1. See the technology in action: book a visit to see product demonstrations, expertise and process in action at our world-class Security Operations Centre Showcase, or your local showcase.
2. Develop your strategy: our BT Security professional services consultants can help you plan, develop and implement your digital transformation strategy.
3. Get started: our choice of security assessments are the starting points for building your transformational roadmap and business case.

[1] BT KPMG Taking the Offensive – working together to disrupt digital crime report 2016

[2] http://www.fatf-gafi.org/publications/high-riskandnon-cooperativejurisdictions/?hf=10&b=0&s=desc(fatf_releasedate)

[3] http://www.dailymail.co.uk/sciencetech/article-4522062/Brothers-trick-HSBC-voice-recognition-software.html

[4] http://www.mirror.co.uk/tech/samsung-galaxy-s8-hacked-tricksters-10488353

[5] https://www.cisecurity.org/controls/

[6] https://www.youtube.com/watch?v=xnJ_hzmlklg

Offices Worldwide

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