



WHITE PAPER

SD-WAN as a service

Changing the
delivery model

evolving.net.uk

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1 Above the ISP

When it became clear that a dramatic change was needed to satisfy the demands of SD-WAN, we built the Evolving Networks SDN Platform. The first Software-Defined Access Network in the UK.

A unique, multi-VNO model, featuring redundancy in all systems, this network of networks lets us sit above the traditional ISP, and build ancillary systems designed to support and augment our connectivity through a series of inter-connected cloud platforms.

This is how we bring human intelligence and artificial intelligence together to work hand-in-hand. AI and network engineers, dynamically managing the network continuously, able to shift customer data and connections away from a single router or an entire datacentre, seamlessly rerouting traffic between our VNO partners, when they see issues arising, or even before.

Contrasting sharply with the way traditional ISPs operate (no bizarre issues such as major routers fighting over which should be “primary”) this approach illustrates the relentless focus of Evolving Networks on connection quality, performance and uptime, over-engineering every component, system and connection on the basis that every one of them can (and eventually, will) fail.

Even the most robust ISP networks sometimes fail. Network performance will sometimes be compromised.

We refuse to accept technology failings

Our network management principles are fundamentally different to those of even the most dynamic ISPs. We refuse to accept technology failings institutionalised by leading router manufacturers and ignored by engineers the world over. Instead, we make it our mission to address such failings, continually improving the performance, quality and uptime of our network for the benefit of our customers, eliminating and mitigating connectivity issues from the simplest to the most complex.

For example, protecting our SDN Platform is a fully independent, distributed, software failover management system. Passing no customer traffic and entirely cloud based, it intervenes when necessary to act on major outages near-instantly, moving traffic between datacentres and core routers. It also stands by to act on our senior network engineers’ commands

The Evolving Networks ecosystem will never be finished – it will always be developing, evolving, improving. ISPs typically replace network infrastructure and then leave it unchanged for several years, sweating the investment. Evolving Networks keeps adding, changing and iterating to address changes in technological capability and the changing business needs of our customers – as well as to implement the innovative ideas generated by our team of software and network engineers.

We operate as the ISP and above the ISP.

This level of abstraction is a complete change in the network management paradigm.

White papers in this series:

- 1 Automating the Wide Area Network
- 2 Why your SD-WAN will fail
- 3 **SD-WAN as a service**
- 4 Mind the gap
- 5 One step at a time

We operate as the ISP and above the ISP

2 Changing the SD-WAN delivery model

The Evolving Networks ecosystem allows for the delivery of fully managed SD-WAN, and comprises a growing list of interlocking platforms and cloud network applications working together to manage the network, solve problems and keep customers online with connections delivering optimal quality and performance.

Fully managed SD-WAN, or SD-WAN as a Service, doesn't just mean your network vendor has partnered with an SD-WAN vendor, so that you are still dependant on a single ISP's network and its failings. That model, while growing in popularity as vendors announce strategic partnerships the world over, does not comply with some of the basic tenets of SD-WAN.

You need a service that is designed as you would design it if you could start from a blank sheet of paper. That has all the benefits of doing everything yourself, with none of the downsides.

Enter our self-healing, over-engineered SDN Platform.

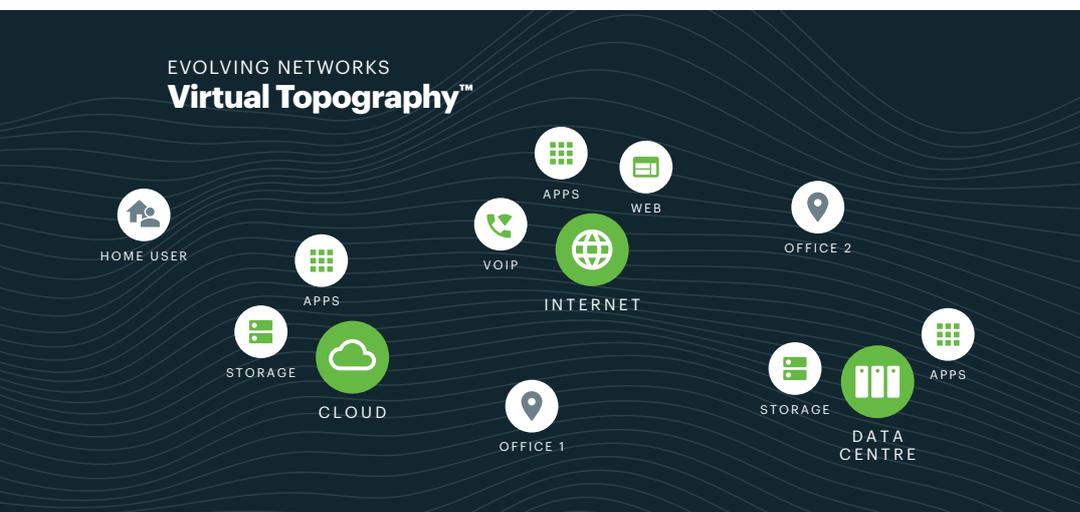
3 Our SDN platform

The SDN Platform provides bespoke, resilient, flexible and scalable connectivity between customer premises and the internet, linking users to applications and data, irrespective of the devices in use, users' locations, or where the applications and data reside. It employs packetlevel traffic management to address the quality and bandwidth issues of the UK broadband infrastructure, including the most problematic aspect of the wide area networking challenge – the customer's connection to the ISP.

Even today, more than half way through the second decade of the 21st century, UK ISPs, including some of the most substantial, have single points of failure in their infrastructure. As a result, service outages still occur, even in networks with significant redundancy built in. Events such as July 2016's London datacentre failures, which took entire ISPs offline, impacting customers heavily, have demonstrated starkly the weakness of the nation's infrastructure.

The SDN Platform is therefore designed from the ground up on a perhaps radical but nonetheless rather obvious premise. Services will fail. Hardware will fail. Circuits will fail. Routers, switches and gateways will fail. Datacentres will fail. Entire ISPs will go offline.

You need a service that is designed as you would design it if you could start from a blank sheet of paper



Harnessing the power of the SDN Platform and the Intelligent Network Fabric, Evolving Networks delivers something new: a unique Network Topography that is bespoke and tailored to each customer.

With this in mind, every aspect of the SDN Platform has been deliberately over-engineered, to remove any single point of failure. Redundancy and resilience are built in, as is swift, automatic failover, throughout the infrastructure. When, or even before a failure occurs, the SDN Platform automatically and seamlessly brings into play a connectivity workaround. In almost every case, customers remain unaware that any issue has arisen, continuing with business as usual.

Transcending the UK's traditional ISP model, the SDN Platform is a multi-VNO framework employing diverse DSL platforms, each with isolated LNS clusters and RADIUS servers, and separate VNO agreements.

In a traditional SD-WAN, you have to source and manage each circuit yourself from multiple carriers, managing those relationships. You'll also need datacentres to host core devices and keep them resilient, and purchase a monitoring system to see what's going on.

Our SDN Platform does all that for you.

Zero congestion, zero contention, and no bandwidth restrictions at any time.

A network of networks, without dependency on a single provider, datacentre or peering point, this is the UK's first ever Software Defined Access Network.

Future proof, over-engineered and always on.

4 No need to source hardware. No lifecycle management.

The Evolving Networks EVX brings packet-level traffic control, as well as monitoring, telemetry and visibility, right to the edge of the customer LAN.

Implemented on our own physical network appliances or as a VNF running on the customer's virtual platforms, the EVX is the intelligent edge device connecting each site to the SDN Platform via our Intelligent Network Fabric (INF).

Rather than source your own appliances to install software you have licenced and need to learn, each EVX, whether an edge appliance on a branch office or a core VNF handling a peering point to your own cloud presence, is part of our SD-WAN as a Service.

The EVX devices handle bandwidth aggregation, WAN Optimisation, Quality of Service (QoS) and failover between lines in the event of faults. They also gather key telemetry and diagnostic data.

In contrast with traditional SD-WAN providers, which often load their on-premises devices much more heavily, Evolving Networks implement all other key functions as large-scale cloud based operations.

This pays dividends in three ways. Firstly, making these additional functions secure is significantly easier in the cloud – it is their natural home. Secondly, by keeping as much load off the EVX as possible, they can be kept relatively lightweight in terms of code, enhancing performance and easing maintenance. Finally, should services beyond the fundamental bandwidth aggregation, failover and QoS functions fail, the EVX will continue to deliver those vital services, keeping customers connected despite the fault.

With EVX appliance on customer premises communicating with the INF, traffic can be managed at the packet level all the way from the Evolving Networks core network right through to the edge of the customer LAN.

Redundancy and resilience are built in, as is swift, automatic failover, throughout the infrastructure.

The Evolving Networks EVX brings packet-level traffic control, as well as monitoring, telemetry and visibility, right to the edge of the customer LAN



With most communications problems, including dead links, bandwidth and quality issues, arising between the core network and the customer premises, this packet-level traffic management delivers extensive user experience and management benefits.

5 No software licencing. No maintenance contracts.

Rather than expensive WAN fabric licencing fees, our Intelligent Network Fabric is embedded in every EVX and throughout our core network.

As your needs extend, so does our network fabric. As your network grows, so does our SDN Platform.

Without having to care about how many appliances, or how many VNF instances you have running, you can focus on delivering high quality cloud apps to your users, instead of having to price up extra licences to cover an extra level of datacentre failover.

6 Outsourced orchestration

Every SD-WAN vendor talks about orchestration, and they do so as if WAN management has only just been invented.

But the trouble with the traditional SD-WAN procurement model is that you are left lumbered with an orchestrator that can do everything.

And in order to configure it to do what your business needs it to do, you need to understand how it does everything first.

There is no sharing of best practice. No benefits of scale. Full control, but full responsibility for success, for failure, and for unintended consequences (this is new technology after all – are you sure that’s how you want it to route your traffic before you click “Go”?) It all rests with you.

The Evolving Networks orchestration model is entirely different. Not only are you outsourcing control, management and configuration to our experienced network virtualisation engineers. You are also outsourcing it to our AI.

Our orchestration platform reacts to decisions made by our engineers, either at your request, or as part of an initial implementation, or automatically through our Direct Action Queue System (DAQS), which in turn is fed by our AI.

The Evolving Networks ecosystem features sophisticated monitoring, telemetry collection and intelligence capabilities. Each of these functions feeds our orchestration engine, which ensures seamless running.

Full control, but full responsibility for success, for failure, and for unintended consequences... rests with you

7 Telemetry, monitoring and network analytics

The ethos behind our ecosystem is to make the best use, in every case, at all times, of device, network and human intelligence.

The EVX therefore works in concert with the wider intelligence of the ecosystem, and Evolving Networks engineers. This cooperation in the collection of telemetry and other diagnostic data is key to the ecosystem’s traffic management, fault detection and fault rectification capabilities.



A huge range of highly detailed information is captured both in the core INF, and, uniquely to Evolving Networks, by the EVX at the customer's end of each connection. With telemetry and diagnostic data collected by the EVX and the INF, the ecosystem monitors every aspect of the network, including the circuits between exchanges and customer premises, which traditional ISPs leave entirely unmonitored.

This flood of telemetry and other diagnostic data, covering everything from sync rates and signal-to-noise ratios to latency and jitter, is continually analysed by the ecosystem's AI engine to inform dynamic routing decisions. It also enables the detection of incipient faults before they impact customers, and, fed back to the EVX in the form of network routing or packet prioritisation commands, reduces their decision-making workload.

The constant flow of detailed connection and network health information is used to the fullest extent by the AI and Evolving Networks engineers to maintain connection quality. As well as being the only way to successfully address the underlying quality issues peculiar to the UK broadband infrastructure, this also enables the identification and rectification of faults at the core network level.

Prevention is substantially better than cure

When it comes to connectivity, prevention is substantially better than cure. Evolving Networks telemetry is therefore focused on detecting and resolving issues before they become apparent as faults. Every day, we detect and rectify potential faults, stopping them from ever manifesting. All our customers see is rock solid, high quality, high performance connections.

And remember, the EVX on your sites will benefit from the shared knowledge gained by others, even outside of your SD-WAN, but connected to the Evolving Networks Ecosystem. You, and every other customer, are benefitting from the combined diagnostic data of every network node connected, regardless of location.

This is unique to Evolving Networks. No other ISP or SD-WAN provider can do this.

If you build your own SD-WAN, then a decision has to be made on how you address these challenges.

Every day, we detect and rectify potential faults, stopping them from ever manifesting

Artificial intelligence works together with human intelligence

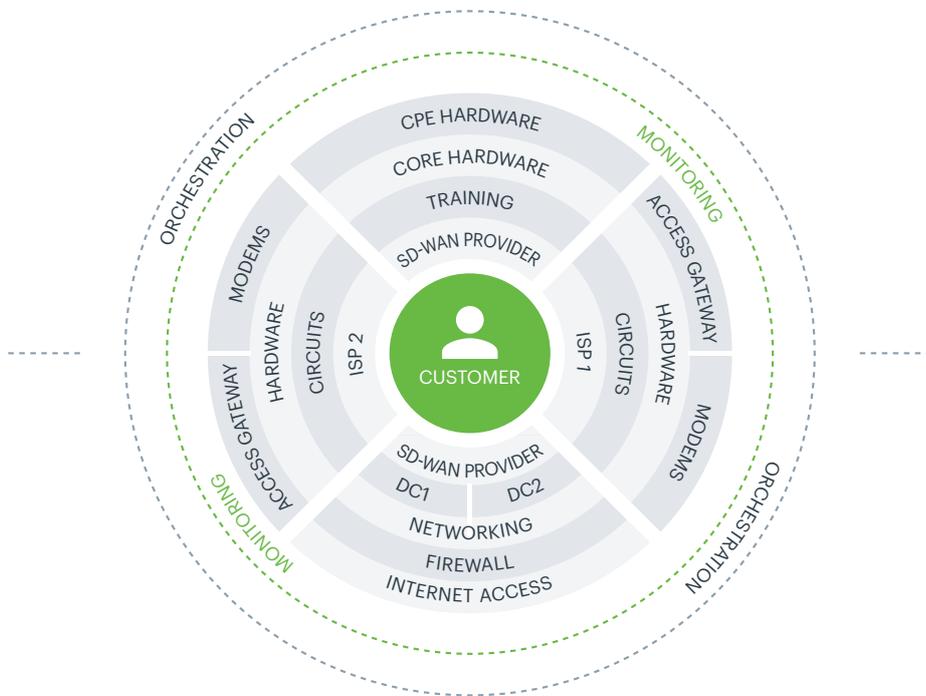
Working together, the various platforms, systems and tools making up the Evolving Networks ecosystem collect and collate a continuous stream of data on every network component's health and performance. Artificial intelligence works together with human intelligence, in the form of Evolving Networks experienced software and network engineers, to process this data, diagnosing, healing, optimising and controlling the network platform.

The design of the SDN platform mitigates and resolves the vast majority of broadband faults with no need for human intervention, identifying patterns and events and acting on them to deliver significant benefits in terms of available bandwidth, connection quality and uptime, to the entire network and its connected customers.

We do this even in the traditional no man's land between the exchange and customer premises. This is the only way to make enterprise-class SD-WAN viable over the UK broadband network, and it's unique to Evolving Networks.



You can do everything yourself, staff up and train as necessary, purchase the hardware, datacentre presence and connectivity vendors as needed, and then find a way of monitoring the whole network. Or you embrace SD-WAN as a Service. Outsourced, fully managed end to end, quick to deploy and only one bill.



Moving from a single vendor MPLS to multi-vendor SD-WAN means a multitude of suppliers, creating management overhead, and creating potential for support & diagnostic challenges.

Learn more

The Evolving Networks ecosystem delivers resilient, agile, intelligent networking, addressing the needs of the 21st century business and is at the heart of delivering SD-WAN as a Service. Connecting users to applications and data reliably, without lag or dropped connections, it enables Evolving Networks customers to focus on what they do best, without the network getting in the way.

To find out more about how SD-WAN as a Service can benefit your organisation, contact Evolving Networks today.



Next in the series:

Mind the gap



Evolving Networks
Nexus House
7 Commerce Road
Lynch Wood
Peterborough
PE2 6LR

+44 330 55 55 333

sales@evolving.net.uk

evolving.net.uk