DemandFlow Logical Network and Services

DEMANDFLOW®

From the customer's service down to the strand it rides on, with the impact of any failure worked out from the model

DATA SHEET

A service provider knows what it sold and what it built, but rarely holds the two in one place. The contract is in the CRM, the VRF and the VLAN in a spreadsheet, the link in an NMS, the circuit in a provider portal and the fibre in a GIS. When a link alarms, finding out which customers are affected and what the SLA exposure is means walking all five.

DemandFlow® models the network as layers that reference each other: offerings, technical services and customer instances; VRFs, VLANs, LSPs, EVPN and VPLS; links, circuits and wavelengths; devices and ports; and the fibre beneath. Impact, diversity, capacity and completeness are computed from those references, so the answer to "what depends on this" comes from the model rather than from someone's memory.

What it is

A logical network and service inventory for altnets, ISPs, carriers, MSPs and data centre operators: a three-tier service model with contracts and SLAs; IPAM with VRFs, prefixes, addresses, VLANs, route targets and allocation pools; transport constructs (links, LSPs with hops and labels, EVPN and VPLS instances, Ethernet segments, circuits, wavelengths and wireless links); a topology viewer with nine lenses; a dependency graph with blast radius, failure what-if and service impact; diversity and single point of failure reporting; capacity forecasting; completeness and data quality scoring; and TMF639 and TMF638 read APIs.

It sits inside DemandFlow, so a service's customer is the CRM account, its contract line is billed, a link rides on a circuit from a provider you manage, a failure what-if reports contract value at risk, and the carriage walk continues into the fibre plant and the physical estate the platform already holds.

What an operator gets

- **The service stack in one picture.** Customer and SLA, logical, carriage, device and site layers for any service, with health from open alerts and a completeness score per layer.
- **Carriage walked to the duct.** From a link down through LAG members, ports, patch cords, circuits, wavelengths, fibre paths, strands, cables, closures and ducts, with shared-risk keys at every level.
- **Blast radius with numbers.** Services fully down and degraded, customers, SLA exposure and monthly value at risk for any device, link, duct, PDU, rack or room, saved as evidence.
- **Topology with nine lenses.** Physical, L2, L3, management, transport, overlay, services, platforms and storage, with traffic and alert overlays, ECMP path finding and a time slider.
- **Diversity you can prove.** Pairs sold as diverse that share a duct, cable, closure, mux or device, and the customers that depend on a single element.
- **Incidents grouped by cause.** Open alerts mapped through the graph to services and customers and grouped by the deepest common provider, with maintenance windows suppressed.
- **Addresses allocated, not guessed.** Next free prefix, address, VLAN, route distinguisher or route target from a pool, against a service, contract line or scenario.
- **Capacity before exhaustion.** Links and pools fitted to a run-out date over 90, 180 or 365 days at an 80 per cent threshold.

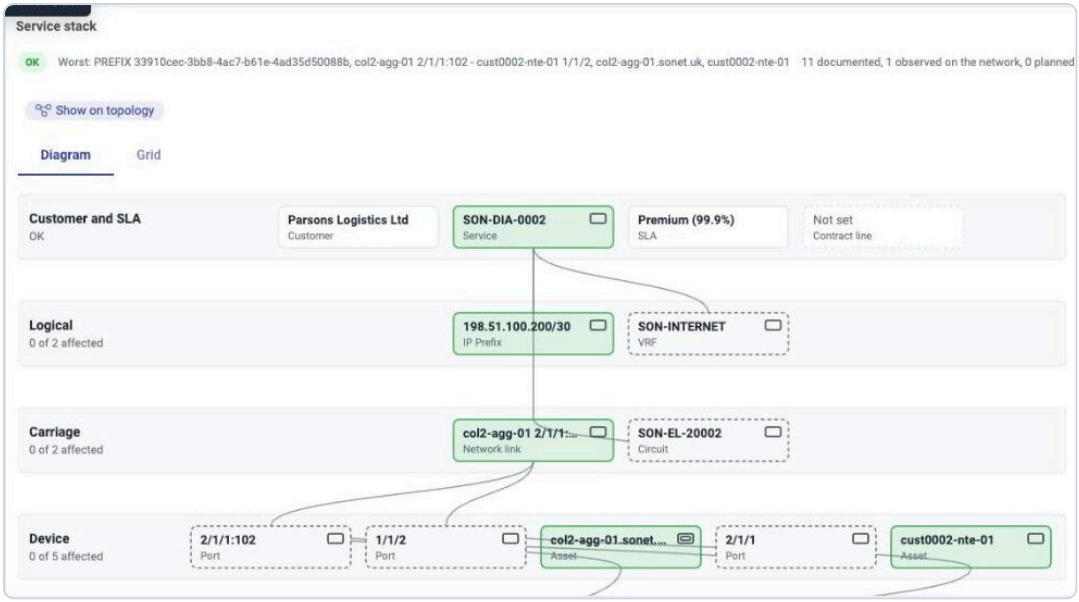

FIGURE 1. THE SERVICE STACK FOR A DEDICATED INTERNET ACCESS SERVICE: CUSTOMER AND SLA, THE PREFIX AND VRF, THE ACCESS LINK AND CIRCUIT, AND THE PORTS AND DEVICES THAT CARRY IT

The service model

Three tiers: the **offering** a customer buys (enterprise, consumer or wholesale, with a default SLA), the **technical service** that delivers it (criticality, availability target, RTO, RPO, maximum latency and carbon) and the **service instance** sold to a customer, of one of fifteen types from VLAN and MPLS L3VPN, L2VPN and E-Line to IPsec, GRE, SD-WAN, LAG, dark fibre and wavelength, in five topologies, with endpoints, MPLS labels and a diverse-from partner.

A service instance links to its customer, contract line (offering, order number, quantity, monthly and one-off value, status) and SLA record (availability, diversity level from none through route, route and PoP, to carrier; latency, jitter, loss and MTTR). Realisation links say what carries it, one resource per role (primary, backup, diverse leg, attachment, transit) and the resource can be a link, LSP, VRF, VLAN, prefix, EVPN or VPLS instance, cloud network, device, IT asset, Kubernetes workload, network function, slice or another technical service. Derive service links proposes realisations from VRF, VLAN, LSP and VNI evidence with a confidence score, and nothing is written until accepted.

Layer	Records
Services	Customer offerings, technical services, service instances and endpoints, service contracts and lines, SLAs, realisation links, dependencies
Overlay and transport	VRFs, route targets, VLANs and groups, LSPs with hops and labels, EVPN and VPLS instances, Ethernet segments, FHRP groups
IPAM	RIRs, ASNs, aggregates, prefixes, ranges, addresses, allocation pools and allocations
Carriage	Network links, circuits and segments, providers, wavelengths, wireless links, logical connections
Functions	VNF, CNF and PNF network functions (AMF, SMF, UPF, NRF, AUSF, UDM, PCF, NSSF, vRouter, vFirewall, vBNG), platform instances, slices
Analysis	Dependency edges, impact records, what-if runs, plan scenarios, migrations, traffic demands, snapshots

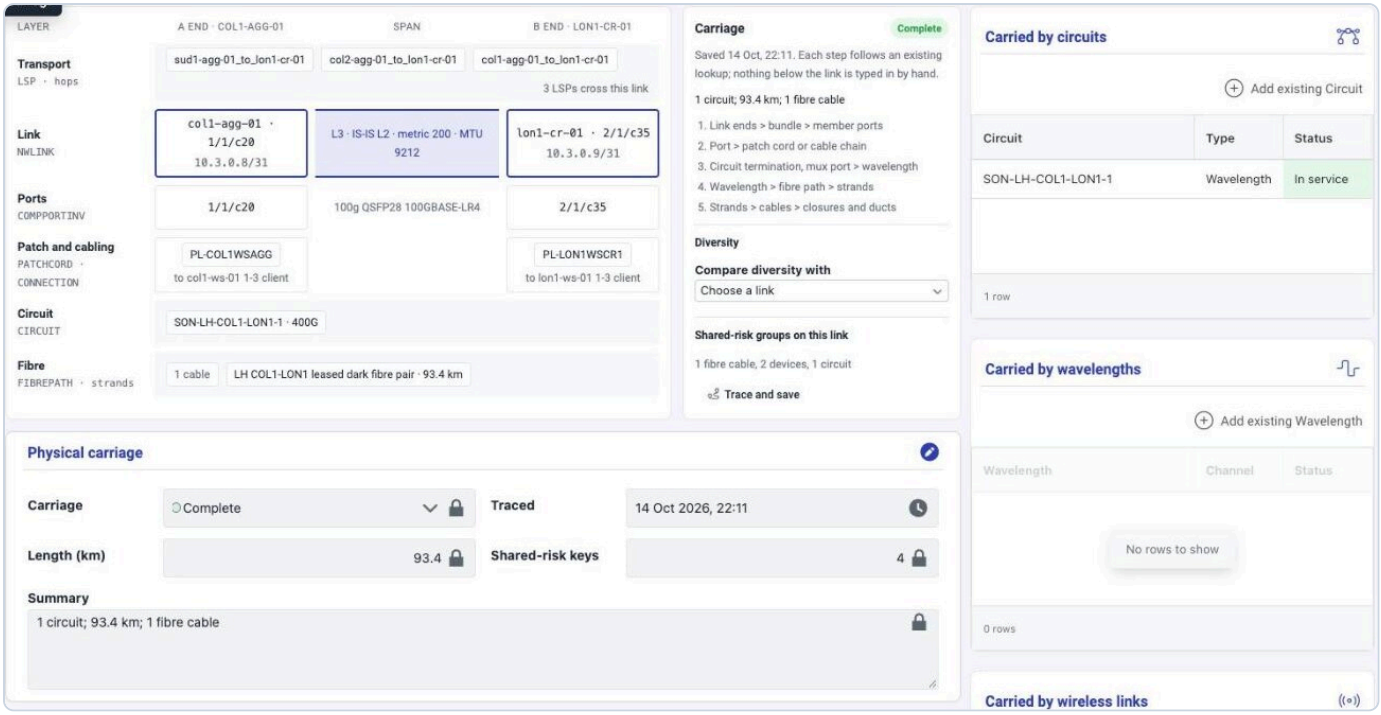

FIGURE 2. CARRIAGE FOR A 100G CORE LINK: THE THREE LSPS THAT CROSS IT, ITS ADDRESSING, THE PORTS, PATCH CORDS, CIRCUIT AND THE 93.4 KM LEASED DARK FIBRE PAIR BENEATH, WITH SHARED-RISK GROUPS AND A DIVERSITY COMPARISON

Topology and the dependency graph

The topology viewer draws up to 5,000 nodes before aggregating, with nine lenses, three states (documented, observed from the latest discovery, and drift), traffic and alert overlays, VRF and plane filters, grouping by site or region and layout by role or site. The path tool finds up to sixteen equal-cost shortest paths by IGP metric; the L3 lens labels interfaces, /30 subnets and loopbacks, and the L2 lens shows VLAN domains, trunks, mismatches and the spanning tree root. Blast radius tiles count LSPs, VRFs, services and platforms with DR outlines; a time slider replays a past discovery or an approved plan; derived links are dashed; and the view exports to SVG, PDF and draw.io.

The network map draws links per site pair over the fibre geometry on a map, coloured by utilisation, VRF count or plane, with diversity rings; the optical isometric view shows DWDM muxes and transponders with one lane per ITU wavelength.

Beneath both is a dependency graph with typed edges: realised by, rides on, carried by, member of, hosted on, located at, attached to, part of and shared risk. Every record has a Depends on this panel with services, customers and value, filtered by edge type and depth from one to ten, and a Blast radius slide-out with Map, Location, Customers, Links, Services, Diversity breaches, Incidents and changes and DR impact tabs that saves as an impact record and can raise a ticket. Power impact is bottom-up: blast radius from an infrastructure unit, feed, circuit, rack or room.

Failure what-if on a device, link or duct reroutes over the IGP and reports services lost and degraded, customers, SLA breaches, contract value at risk and links pushed over 80 per cent, for a chosen demand year, drawn on the topology and saved. **Service impact** groups open alerts into incidents by probable root cause, suppresses alerts inside a maintenance window and draws the affected path. MCP tools expose blast radius, dependants, what-if, allocation, snapshot comparison and draft scenarios and changes to assistants, read-mostly and audited.



FIGURE 3. THE L3 LENS: BORDER, CORE AND AGGREGATION RING ROUTERS WITH IGP METRICS, LINK WIDTHS BY CAPACITY, SITE AND ROLE FILTERS, AND THE BUSIEST LINKS IN VIEW

IPAM, allocation and capacity

IPAM holds RIRs, ASNs, aggregates, prefixes, ranges and addresses for IPv4 and IPv6 with utilisation computed and next free prefix or address offered. VRFs carry route distinguishers and import and export targets; VLANs from 1 to 4094 can be parsed from switch output; LSPs carry traffic engineering fields, pseudowire labels and hops with in and out labels; EVPN instances carry EVI, VNI, RD and RT. Link addressing is filled from the addresses on the interfaces, and a virtual lens follows a VM to its port group, virtual switch, host, top-of-rack and fabric.

Allocation pools cover prefixes, addresses, VLANs, VRFs, route distinguishers and route targets. Allocate next takes the next free value against a service, contract line or scenario; release is manual; the pool is drawn as a block map, number grid or bar with the next free value outlined.

Capacity forecast. Every link and pool is fitted from its nightly utilisation history to an exhaustion date over 90, 180 or 365 days against an 80 per cent threshold, with draft demand records for the planner. Three history points are needed before a trend is reported.

Diversity and SPOF. Pairs sold as diverse that share a duct, cable, closure, mux or device; customers that depend on a single element; findings saved and shown on the map.

Completeness and data quality. Every service is scored across its logical, carriage, device and site layers, worst first, with roll-ups by customer and platform and a lowest-twenty chart; the score is written back to the service. Data quality is scored per site and domain. Drift between documented and observed becomes proposals; migration plans list dependants, targets and cutover waves; logical plan scenarios stage changes on the topology with before and after comparison.

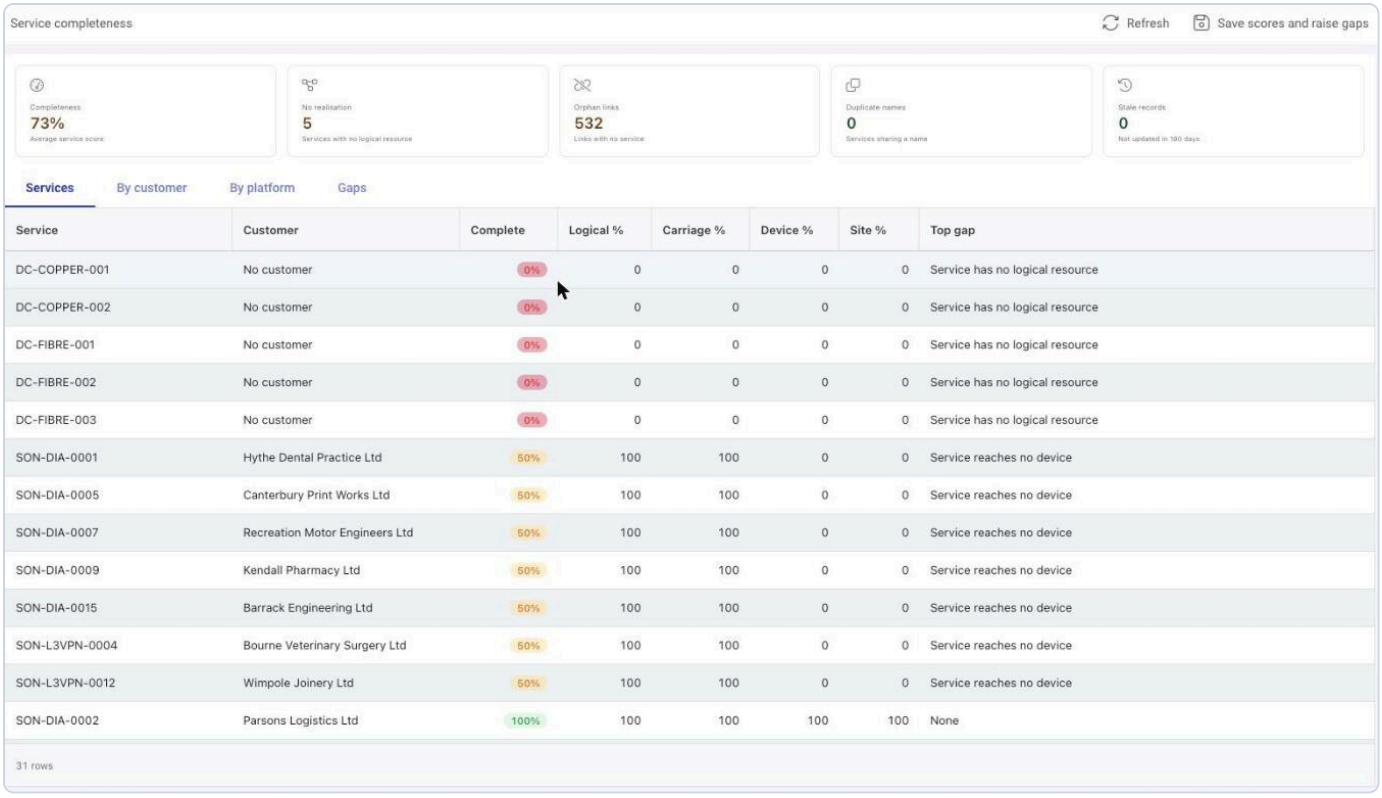

FIGURE 4. SERVICE COMPLETENESS: A 73 PER CENT AVERAGE, FIVE SERVICES WITH NO LOGICAL RESOURCE AND 532 ORPHAN LINKS, WITH EACH SERVICE'S LOGICAL, CARRIAGE, DEVICE AND SITE SCORES AND ITS TOP GAP

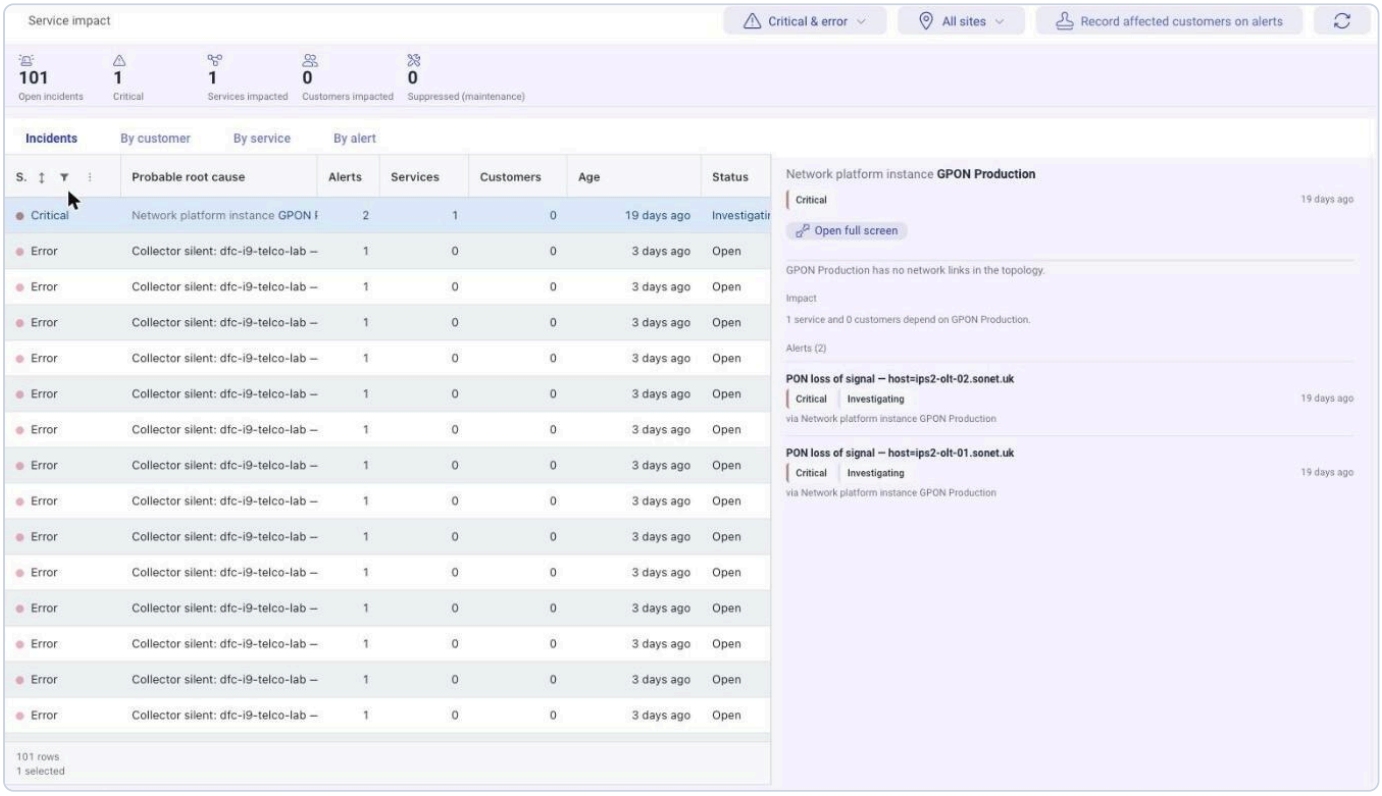

FIGURE 5. SERVICE IMPACT: 101 OPEN INCIDENTS GROUPED BY PROBABLE ROOT CAUSE, WITH A CRITICAL PON INCIDENT TRACED TO A PLATFORM INSTANCE AND THE TWO ALERTS BEHIND IT

Summary of specifications

Item	Detail
Service model	Offering, technical service, service instance; 15 instance types, 5 topologies; contract lines (ordered, active, ceased, cancelled); SLA availability, diversity level, latency, jitter, loss, MTTR; one resource per realisation role; derived realisations with confidence, accepted before written
Service stack	Service, logical, carriage, device, site layers; health OK, degraded, down, unknown from open alerts; completeness per layer; service takes the worst health beneath it
Carriage	Link to LAG members, port, patch, cable, circuit, wavelength, wireless link, fibre path, strand, cable, closure, duct; shared-risk keys for duct, fibre cable, closure, WDM mux, ODF, device, circuit, wavelength, wireless link; complete, partial or untraced; diversity comparison between links
Topology	9 lenses; documented, observed, drift; traffic and alert overlays; VRF and plane filters; group by site or region; 16 ECMP paths by IGP metric; blast radius tiles; time slider; 5,000 nodes before aggregation; export SVG, PDF, draw.io
Dependency graph	Edges realised by, rides on, carried by, member of, hosted on, located at, attached to, part of, shared risk; depth 1 to 10; dependants to 2,000 rows; impact saved as records
What-if and impact	Reroute over IGP; services lost and degraded, customers, SLA breaches, contract value at risk, links over 80 per cent; incidents grouped by deepest common provider; maintenance windows suppressed
IPAM	IPv4 and IPv6 next free; VRF with RD and RTs; VLAN 1 to 4094; LSP TE fields and labels; EVPN EVI, VNI, RD, RT; pools for prefix, address, VLAN, VRF, RD, RT with Allocate next and manual release
Capacity	Links and pools; linear fit of nightly history; horizons 90, 180, 365 days; 80 per cent threshold; 3 points minimum; draft demands
Quality	Completeness per service over 4 layers with roll-ups; data quality per site and domain; diversity and SPOF findings; migrations with cutover waves; plan scenarios with before and after
APIs	TMF639 resource and TMF638 service read APIs (devices, ports, links, circuits; technical services with supporting resources; 1,000 per page); REST graph and allocation endpoints; MCP blast_radius, dependants, what_if, allocate, compare_snapshots, draft_scenario, draft_change

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