



IP Multimedia Interconnect



*IP-interconnecting your networks with the world
seamlessly and cost-effectively*

*White Paper
January 2011*

GENBAND IP Multimedia Interconnect Solution

A Next Generation Network (NGN) carrier-grade IP multimedia interconnect solution for seamless interworking between TDM and IP, and between different IP networks in line with IMS, VoLTE, IPX and IP standards.



There is no doubt that IP is the technology of choice for next generation telecommunications networks, specifically as broadband access technologies continue to improve in capacity and speed, enabling operators to offer advanced multimedia services to the end user. In addition, more operators are choosing to deploy the 3GPPs IP Multimedia Subsystem (IMS) standards architecture as their network architecture of the future with one analyst predicting over 470M IMS subscribers by 2014. So why not look at a complete end-to-end solution that seamlessly interconnects your disperse TDM and IP communications networks as well as cost-effectively IP interconnecting

with other carriers. Generate new revenue, expand subscriber base, securely interconnect your VoLTE network with other carriers around the globe and/or become an advance IP exchange operator beyond GSMA & i3Forum specifications.

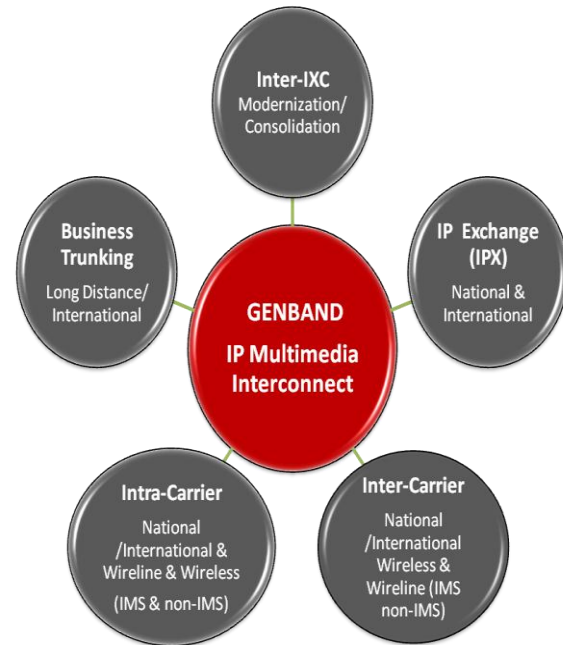
As carriers & service providers move more of their services and traffic to IP-based networks, the complexity required to interconnect these various types of access technologies (as well as to interconnect with other operators via IP) is growing dramatically. Strategies for interconnecting the heterogeneous IP access technologies and for carrier-carrier IP interconnections, while providing interconnection and service transparency with the still largely deployed TDM networks have been ad hoc to date, resulting in solutions that are hard to scale and sustain.

As a market-leading supplier for voice and multimedia over IP solutions, the GENBAND IP Multimedia Interconnect Solution enables the seamless any-to-any (IP-IP, IP-TDM, and TDM-TDM) interconnection of fixed and mobile voice and multimedia traffic. This

end-to-end, open standards-based solution utilizes GENBAND's rich portfolio of market-leading IP media and session border controllers, call servers and gateways to reduce costs, expand markets, and interwork with the growing number of peering and managed interconnect such as:

- ① **GSM Association's IP eXchange (IPX)**, is IP interconnecting carriers via IETFs Session Initiation Protocol (SIP) suite enabling new revenue opportunities for carriers through rich communication services. This spec is also been adopted by the i3Forum, a carrier only organisation.
- ① **Inter-carrier and inter-IXC interconnect** for cost effective national and international voice services enabling carriers to interconnect using TDM and legacy IP protocols such as IETFs SIGTRAN, ITU-T H.323 and 3GPP BICC as well as interworking with the globally growing IETF Session Initiation Protocol (SIP) suite.
- ① **Intra-carrier interconnect services** for reducing costs and offering rich unified communication services across a carrier's various business groups as well as between a carrier's access and core network such as broad band (DSL, Cable, Wireless) access SIP solutions and between ever-growing IMS networks with non-IMS IP networks.
- ① **Business Trunking services**, providing efficient and cost effective interconnection

between businesses as well as within businesses' globally disperse offices supporting the benefits of rich communication



services.

The GENBAND IP Multimedia Interconnect Solution enables the *seamless end-to-end inter-connection* between networks belonging to one or different owners for the purpose of delivering voice and multimedia services across the interconnected networks. The solution enables any technology to be interconnected, be it IP-IP, TDM-IP, TDM-TDM and enables operators to achieve over 50% OPEX saving versus growing with traditional TDM interconnection. This end-to-end, open standards-based solution utilizes GENBAND's rich portfolio of market-leading IP media and session border gateways to reduce costs, expand markets, and interwork with the growing volume

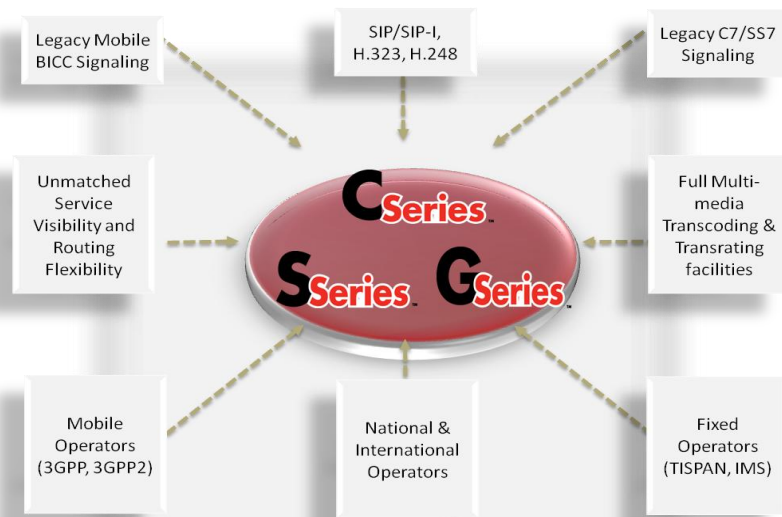
With GENBAND's IP Multimedia Interconnect achieve over 50% OPEX savings versus traditional TDM interconnect

of peering and managed interconnect services like the GSM Association's IP eXchange (IPX) or the GSMA VoLTE "one voice" initiative which defines a single IMS-based "target" solution for voice.

Network operators are increasingly challenged to profitably manage voice and multimedia traffic that flows between their networks and other networks. This interconnect traffic can come from many sources including their own heterogeneous access networks, other fixed and mobile operators, intra-company divisions, wholesale partners, and peering exchanges. The volume and complexity of this traffic has grown substantially in recent years due to the migration to Voice over IP in both fixed line and mobile voice core networks. Operators typically use Time Division Multiplexing (TDM) for network-to-network interconnects, but their TDM investments are no longer meeting all of today's complex needs, nor do they enable new services. Also, on the IP access side, operators currently have distinct standalone islands managed by separate stand-

alone department, which causes inefficient use of resources that could otherwise be shared. This also increases costs and hinders expansion of revenues and subscribers.

Operators want to reduce transaction costs by capping or replacing their legacy TDM networks, but at the same time find new ways to cost-effectively route both TDM minutes and the growing volume of mobile and SIP/VoIP minutes across national and international backbones. Operators are also being challenged to improve scale, enhance QoS, as well as reduce the number of interconnecting network components and operational complexity. In order to reduce costs, many carriers have been evolving their SS7 TDM networks to IP by converting their STPs to IP-STPs using SIGTRAN protocols for interconnection in order to capitalize on existing SS7 network investments. The requirements to support a diverse set of IP and legacy signalling protocols for interconnecting with other carriers



**Unified Security
Unified Manageability**

while moving to IPX and IMS architectures and ensuring end-to-end QoS, and providing low-cost but high-quality media interworking are just some of the key challenges that can hinder market acceleration.

The GENBAND Interconnect Solution gives operators the ability to cap or replace their legacy TDM networks, while interconnecting and intelligently routing traffic on an any-to-any basis, whether IP (legacy and SIP), TDM, fixed, or mobile. Advanced policy enforcement, reporting, and routing, in addition to a single management umbrella, simplifies operations and enhances service visibility. Support for interfaces such as C7/SS7, BICC, SIP-I, H.323, and Nb/Nc ensures broad global coverage, irrespective of the mobile or fixed origin or destination of traffic. In addition, GENBAND's flexible architecture allows for massive scalability by providing both integrated and decoupled signalling and media interworking options, as well as multimedia trans-coding with extensive codec support.

GENBAND's rich portfolio of products are at the heart of this groundbreaking solution, providing IP to IP, IP to TDM, and TDM to TDM signalling and media interworking to ensure complete, effective coverage for all traffic and signalling types. The solution uses the GENBAND G-Series media gateways for IP, TDM, fixed and mobile voice and multimedia interworking and trans-coding; the C-Series call controllers and soft-switches for media resource and gateway control as well as IP to

IP Multimedia Interconnect Key Benefits

- Simplifies the transition to VoIP with any-to-any voice and multimedia interconnections – IP to IP, IP to TDM, TDM to TDM (fixed, mobile, and satellite)
- Creates a competitive advantage by reducing the number of network components and transaction costs, and enhances QoS and voice handling
- Enables fast ROI and reduces time-to-market for new services
- Creates new opportunities for growth and expansion, such as interconnection with GSMA's IPX and other peering services
- Allows effective cap-and-grow migration for TDM assets
- Reduces capital and operating cost structure for greater margin flexibility
- Simplifies operations and improves service visibility via a single vendor solution under a single management umbrella
- Massively scales with support for integrated or decoupled options
- Supports open standards and is IMS compliant; future-proofs network investments
- Exploits the network and extends the brand across new market segments and geographies

TDM signalling interworking (SIGTRAN, SS7, BICC, SIP-T/SIP-I) and advanced voice and multimedia services; the S3 Session Border Controllers which are integrated SBC, P-CSCF and BCF for advanced IP Interconnect and IPX-proxy functions such session management, security, policy enforcement, IP signalling and media protocol interworking and advanced real-time session monitoring and management; and the centralized SR3 Routing Proxy

or partner platforms, such as ENUM and Routing servers, for advanced centralized policy routing. Global management is provided by the GenView™ network management system.

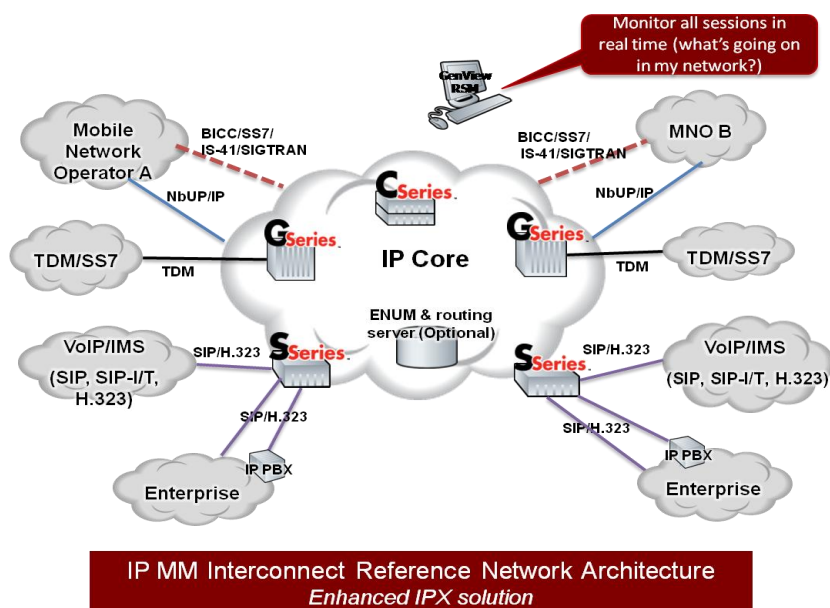
Unlike other vendor solutions that only solve part of the problem, GENBAND provides an open standard, single vendor solution that enables the interworking of traffic from GSM and non-GSM operator networks, TDM-based fixed and mobile networks, and SIP-based VoIP and multimedia networks. The solution also encourages revenue growth by allowing operators to expand their network capabilities and offer new types of Rich Communication Services (RCS), as well as extend their brand across new market segments and geographies. In addition, because of compliance with open standards, any component of this solution can easily be added to existing networks.

Mobile and fixed line networks are rapidly evolving to IP-based VoIP and multimedia services, creating a growing global demand for interconnection and peering of IP traffic at the borders between networks. As a pioneer in session border control, GENBAND

provides market leading, high performance IP peering and interconnect border control solutions that allow high-quality voice and multimedia sessions to flow efficiently, securely, and reliably between network borders.

Unlike legacy circuit networks where traffic flow was structured and homogeneous, IP traffic is inherently heterogeneous with a diverse set of protocols and network configurations that require complex inter-workings and policy control over IP sessions. IP is not tied to any specific network facility so it can enable many new revenue generating multimedia services. However, traffic needs to be intelligently routed and managed, and since IP is also very open, it could expose network borders to the security risks inherent in the Internet.

Due to this complexity, operators tend to deploy ad-hoc individual



separate IP networks to cater to a

specific need using a myriad of components from different vendors which further increases complexity and operational costs. As indicated in the previous section, GENBAND provides a complete end-to-end solution for both access and carrier/network IP interconnect enabling:

- ⊗ Reduced time to market for new services and expansions
- ⊗ Extensive interworking between all nodes and a myriad of signalling protocols
- ⊗ A common management system further reducing operational costs
- ⊗ Investment protection with standard COTS hardware and specifically GENBAND's ground-breaking next generation GENIUS middle-ware on standards-based COTS AdvancedTCA hardware.



When moving to an all IP network operators must consider the following key Interconnect functions:

- The application and Call Control layer Interconnect function: seamlessly interworks TDM with IP for both wireless and fixed networks as well as the myriad of IP signalling and a call control protocols. Interconnect at this layer

should provide advanced routing either directly or via interfaces into external advanced ENUM or routing servers that centralize number translations and routing. In addition, this layer should be able to support new revenue generating advanced rich communications services allowing operators to break away from the bit-pipe service offering.

- The media Layer interconnect function: provides a complete range of solutions to help service providers migrate their networks from TDM to IP both directly from access to IP as well as from TDM trunks to IP. In addition this layer is responsible for interconnecting different IP bearer networks such as wireless-wireline IP networks, different business IP networks, etc. Functions performed include trans-coding and packet rate adaptation.
- Border Control, Security and Interworking at the edge of operators' networks: provide comprehensive security, session management, and policy enforcement; along with the optional advanced routing that may be required at the edge of IP interconnect networks. This function should also provide another layer of signalling and bearer interworking at the edges of the network, off loading this function from the control layer. As well, interworking at the edge enables operators to rapidly expand their subscriber

base.

- Common OAMP enables seamless FCAPS management and billing as well as real-time end-to-end session monitoring and reporting.

At the heart of this groundbreaking solution are the following GENBAND products designed to be carrier-grade meeting, and sometimes exceeding, five 9s reliability:

GENBAND C-Series softswitches, C15™, C3™ and C20™, provide call control advanced routing, protocol interworking and integrated VOIP and Multimedia applications to manage complex interworking for fixed networks, IPX solutions as well as interworking between mobile and fixed networks. GENBAND has been recognised by leading analysts as the #1 switching vendor for last 8 consecutive years.



The C-Series products provide:

- ⊕ Efficient open standards interworking between TDM protocols, TDM and IP protocols as well as the myriad of IP protocols both fixed and

mobile (such as but not limited to SIGTRAN, NCS, H.248, BICC, MGCP, SIP, SIP-T, and SIP-I ...). This enables carriers to cost-effectively deploy customer premises devices delivering traditional and next-generation telephony services.

- ⊕ Advanced call control for both TDM and IP enabling seamless migration from TDM to IP, providing services from regulatory, legal intercept, emergency, to advanced call routing and IP trunking.
- ⊕ Advanced applications such as VOIP VPN, Business Trunking (SIP, H.323 and PRI/QSIG PBX), pre-paid/post-paid services, long distance services, mobile backhaul for SMS, unified communications and fixed mobile convergence services as well as an overlay of residential and business rich communications services.
- ⊕ Flexible market options, enabling service providers to introduce SIP voice and multimedia features to geographically dispersed markets. This provides the scalability needed to grow a subscriber base in a flexible, targeted way – including small-pocket service areas – while minimizing backhaul costs.
- ⊕ Carrier grade with over five 9s reliability based on based on GENBANDs next generation ATCA hardware platform called GENiUS™ powered by its groundbreaking patented middleware called GENWare™.

GENBAND G-Series media gateways, which have also been recognised by leading analysts as number 1 media gateway. The G-Series portfolio enables carriers to support population densities of all sizes, to cost effectively meet carriers' disperse market demands.



The G-Series enables access to POTS lines interconnecting to IP, TDM-IP trunking as well as IP-IP interconnect, making the G-Series media gateways the key network element in advanced 3GPP, 3GPP2, and TISPAN architectures. Specifically the G9™, based on GENBAND's next generation ATCA hardware platform powered by its groundbreaking patented GENiUS™ middleware, was built from the ground up for wireless, wireline, and converged networks.

- ☞ State-of-the-art, latest generation of open standards IP gateway
- ☞ Provides true network convergence with support for wireless and wireline codecs, protocols, interfaces, and solutions
- ☞ Enables advanced media

processing at TDM to TDM, TDM to packet, and packet to packet network borders

- ☞ Simultaneously supports multiple service architectures for investment protection and platform re-use
- ☞ Leading-edge 3GPP Mc and IMS-compliant Mn interfaces
- ☞ Extensive, network-proven interoperability with next generation call control and access platforms
- ☞ Reduces operator costs by integrating many features into a single IP gateway platform
- ☞ Fully redundant with no single point of failure
- ☞ Scales easily for low-to-large sized applications
- ☞ Latest generation of media gateway platforms with state-of-the-art system architecture and components

GENBAND's S3™ Session Border Controllers provide comprehensive carrier-class security, session management, and policy enforcement; along with the advanced routing required in IP interconnect networks.

Deployed in over 500 customers around the world, the S-Series platforms are used in the world's largest service provider networks as the critical border element to securely manage, route, and control real-time voice and multimedia sessions at network-to-network interfaces.

GENBAND's S3™ Session Border Controller delivers secure carrier class, real-time communications



for mobile and fixed line service providers, enabling new service offerings, rapid revenue generation and network cost-savings.

- Ⓢ **Carrier-to-Carrier:** The S3™ provides secure connectivity with granular controls to proactively manage interconnect quality, capacity, and availability, supporting bilateral and multilateral carrier interconnect agreements for national call routing, international long distance, and local PSTN termination.
- Ⓢ **Carrier-to-Enterprise Access:** Normalizing traffic for seamless connectivity between carrier and enterprise networks, the S3™ provides extensive SLA management, SIP trunking, PBX/IP PBX and H.323/SIP interworking, and call centre and hosted VoIP application support
- Ⓢ **Carrier-to-Consumer Access:** The S3™ protects the network edge with overload protection via multi-stage rate limiting policies, registration throttling, and subscriber authentication and authorization, enabling operators to deliver the highly differentiated voice and multimedia services

With extensive security, policy enforcement, and session management capabilities, the S3™ brings operators advanced levels of functionality, flexibility, and performance at IP network borders such as:

- Ⓢ Advanced IP Network Interconnects using best-of-breed security, session management, policy enforcement, and routing solutions, with carrier-class robustness, redundancy, and fault tolerance
- Ⓢ Purpose-built to accommodate large scale, high volume interconnect traffic
- Ⓢ Improved network and transport efficiencies, with advanced intelligent session routing including dynamic route hunting, adaptive routing, and least cost routing
- Ⓢ Enhanced revenue assurance with the GenView-RSM element manager for dynamic policy and SLA management, route analysis, billing, and session detail analytics
- Ⓢ Cost-saving participation in bilateral or multilateral IP peering, wholesale, and registry services
- Ⓢ Simplified border management and rapid installation, network turn-up, and interoperability by seamlessly interworking disparate IP traffic and protocols
- Ⓢ Cross-border communications by trans-coding between diverse fixed line and mobile IP codecs, when used in conjunction with GENBAND's G9 Converged Gateway

- ⊗ Standards-based compliance in IMS, MMD, TISPAN NGN, Packet-Cable and MSF architectures
- ⊗ Protects the core service provider network against service-disrupting attacks
- ⊗ Highly reliable, field-proven, software-centric platform, supports the separation of signalling and media planes, and operates on commercial, standards-based hardware

GENBAND's GenView™ Element Management System: As network operators deploy new platforms, they want to ensure that these new systems can be easily integrated into their networks and that ongoing Operations, Administration, Maintenance, and Provisioning (OAM&P) costs are minimized. GenView's functionality is further extended with **GenView-Real-time Session Manager (RSM)** for GENBAND's S-Series session border control products. GenView-RSM has additional tools to manage service level agreements (SLAs), provides QoS metrics and comprehensive session analytics, and enforces subscriber and network policies for consistent

delivery of services.

The GenView™ Element Management System (EMS) is the comprehensive element manager for GENBAND's IP Multimedia Interconnect product portfolio, providing complete single point for Fault, Configuration, Accounting, Performance and Security (FCAPS) functionality for network operators.

Key Benefits include:

- ⊗ High availability server environments
- ⊗ Comprehensive configuration and provisioning tools
- ⊗ Intuitive fault, troubleshooting, and system diagnostics
- ⊗ Extensive options for managing network elements and system performance
- ⊗ Advanced system security and accounting management
- ⊗ Customizable graphical interfaces for significant operational benefits
- ⊗ Command line interfaces and GUI cut-through to CLI
- ⊗ Standards-based, open interfaces to OSS/NMS

Comprehensive centralized routing: via third party ENUM and



Always know what is going on in your network without having to send engineers to the field!

Routing servers (such as NETNumber's TITAN routing server) embedded within the C-Series or S3™ SBC, or GENBAND's dedicated routing module called SR3™. The SR3™ Route Proxy provides a high capacity session routing engine that enables service providers to deliver interactive multimedia services across next-generation networks. The SR3™ eliminates the guesswork in maintaining target profitability. Using a powerful, easy-to-use business rules interface, the SR3™ enables clients to set call routing profit targets with point-and-click ease. Using the client's rule set, calls are automatically routed along the path that yields the best combination of fiscal return and call quality. The SR3™ seamlessly integrates with GENBAND's broad portfolio of session border controllers (SBCs), C-Series call controllers and A-Series application servers to deliver higher traffic volumes, with higher call profitability and superior management control. In conjunction with S3™, C-series, and A-Series, the SR3™ assists service providers with:

- Reduction in provisioning complexity.
- Centralizing of provisioning for all locations
- Providing natural scalability when each site requires more than a single SBC cluster

Post launch assessments show major operators pickup 10-12% of margin dollars on existing traffic, and decrease port utilization by 50-66%. These changes resulted in

reduced manpower as the SR3 makes it easier to manage the business

To sum up, GENBAND's SBC products are widely deployed state-of-the art, carrier grade security platforms that enable the secure interworking of voice and multimedia sessions between diverse IP networks in a variety of applications.



In addition, not only does GENBAND provide the *boxes* for an advanced IP Multimedia Interconnect solution, but also a highly skilled global professional services team that will ensure successful deployments for both access and carrier interconnect.

GENBAND's Global Professional services team is a highly skilled group of experts that have migrated over 40 million TDM lines to IP (a number that continues to grow).

- Flexibility / Responsiveness: a combination of full time and external resources to ensure both local presence and the flexibility to meet demands.
- Competence: specific organizations are centralized, ensuring best practices, continuous improvement and a tight loop back to the product /solution design organizations. Examples include Emergency Recovery, Disaster

Management and Software Delivery.

A successful Professional Services organization has to excel in the age old enterprise problem of balancing volume with variability. Either one can be achieved, but the art is in maintaining the balance between the two.

GENBAND has developed and continuously improved a repeatable process at a functional level that enables us to achieve the volume of deployments we have managed, across a variety of service providers that includes the “super” carriers like Verizon, BT, Telefonica, Optus, Vimplecom, or AT&T, the MSO (cable and entertainment providers), the alternate operators and the local service providers that operate at a state, or even a county, level.

The GENBAND Global services team closely works with our



customers from the conception of the IP multimedia Interconnect solution with presales activities such as initial requirements capture, network design and architecture as well as implementation of trials and solution verification, through to detailed network planning and design, installation, integration and acceptance as well as hardware and software support via the highly experienced dedicated global GENBAND Care team.

GENBAND is a global leader of IP infrastructure and service solutions, helping fixed, mobile and cable service providers around the world evolve communications networks through IP innovation. The Company offers market-leading Switching, Networking and Service solutions, with products deployed in over 600 customer networks spanning more than 80 countries. GENBAND is headquartered in Plano, Texas, and has operations in 50 countries. To learn more, visit us on the web at www.genband.com.

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DRIVING THE NETWORK EVOLUTION