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## An adaptable signalling and media gateway

GroomerII is offered as a cost-effective, signalling and media gateway for any telco or service provider function where there is a need for SS7-to-SIP voice network interworking.



It also enables the rapid delivery of IP-based, revenue generating, added value services into SS7 and legacy CAS and PRI networks. And, because GroomerII is an adaptable, integrated appliance, it can be readily used for many VoIP gateway functions.

Scalable 1U, 2U and 6U rack-mountable configurations offer combined signalling and media gateway capability, transcoding, protocol conversion, and powerful call routing features for all supported protocols – whether CAS, MFC R2, T1RBS, DPNSS, BT DASS2, ISDN PRI, Q.SIG, SIP or SS7.

GroomerII is a gateway solution that can be used to add new telephony services, extend existing infrastructure, and reduce costs in support of a migration strategy to an all IP architecture. In short, GroomerII is a powerful and adaptable problem solver.

## Enabling interoperability in a converging world

In GroomerII, a broad spectrum of users – equipment manufacturers, solution vendors, resellers, systems integrators, service providers and telcos – have the ideal solution for their TDM-to-IP (and TDM-to-TDM) gateway, protocol conversion and interworking requirements.

GroomerII provides a compliance tested, deployment proven solution for interconnecting not only TDM networks, but also for connecting to SIP networks and equipment, such as IP-PBXs and communications managers from Siemens and Avaya.

Unlike commodity gateway products, GroomerII provides customers with enormous flexibility in configuration and usage, including many routing features, otherwise available only by using a separate softswitch or media gateway controller.

As a stand-alone integrated appliance, GroomerII has no peers when it comes to looking for a resilient and reliable, tried and tested solution that can be deployed practically anywhere in the world.

## Typical applications

GroomerII is installed in many locations worldwide to solve a variety of problems and is typically deployed as a signalling and media gateway between public or private networks and hosted IP platforms, contact centre switches, IP call managers or PBXs with disparate TDM or IP interfaces.

In addition, carriers can provision GroomerII as a legacy network gateway protocol interface function (LNG-PIF). This means GroomerII can be used to interconnect wired and wireless networks with a SIP-based E9-1-1 for emergency call handling by next generation E9-1-1 public safety answering points (PSAPs).

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GroomerII gateways allow carriers or service providers to connect TDM equipment to IP networks or hosted IP-based service platforms to circuit switched networks. It can also be used by equipment manufacturers as a protocol converter to interface equipment to public networks. In addition, network providers and telcos can install GroomerII as a means of connecting enterprise customers' PBXs, running a variety of disparate protocols, to their networks.

In such ways, GroomerII helps to avoid the need for expensive, bespoke PBX solutions or the investment in new product development to enable interworking with different networks. And, because GroomerII is an adaptable, integrated appliance, it can be readily customised for a variety of application requirements.

### Product features

- Signalling and media gateway – SS7-to-SIP interconnection
- A call manager offering call routing, numbering plans, translation and mobility, alternative routing, black/white lists
- Protocol conversion –SIP, SS7 and most ISDN and CAS networks, including T1RBS, MFC R2, NI-2, DMS100, Euro ISDN, BT DASS2, DPNSS and Q.SIG
- Interoperation with SIP Proxy server network entities
- External database connectivity – number portability and CLI or DDI-based (ANI or DNIS-based) routing
- Connecting E1 and T1 networks with A-law and  $\mu$ -law encoding conversion
- Simultaneous use of multiple protocols
- Scalable hardware configurations available, offering from 2 to 40 E1/T1 trunks
- 1U, 2U and 6U rackmount models available with SNMP V2, remote management (KVM) control, hot swap PSUs and RAID Level 1 disks
- Full compliance with European and Chinese RoHS legislation and requirements for WEEE
- Compliance tested with Siemens' HiPath and OpenScape products and the Avaya Communication Manager

### Product benefits

- GroomerII provides many routing features otherwise available only by using a separate softswitch or media gateway controller, making it an extremely adaptable problem solver
- A signalling and media gateway alternative to maintaining expensive, bespoke PBX solutions for service interconnection
- GroomerII can be used to extend the capability of existing TDM or IP infrastructure, reduce cost and help to deliver added value, revenue generating services
- Enables service providers to cost-effectively connect hosted SIP-based service delivery platforms to the SS7-based PSTN/PLMN
- Many unique features make GroomerII particularly suited for interconnection between SS7 and SIP in next generation E9-1-1 PSAP applications
- Can be used to add IP functionality to an existing PBX/ACD or connect an IP-PBX to an SS7 or ISDN PRI network
- A resilient and reliable, tried and tested protocol converter that can be deployed practically anywhere in the world due to the wide range of available protocols and approvals
- Much more than a commodity media gateway, GroomerII offers many essential call routing features, such as: CLI or DDI-based (ANI/DNIS) routing; numbering plans, translation and portability; fallback routing; black/white lists; an ODBC interface; and dual redundant SS7 signalling

## Call manager features

### Call routing

The call routing capability of GroomerII is a feature that underlines its adaptability, enabling the resolution of many problem scenarios. For example, network providers have installed GroomerII as a means of connecting their enterprise customers' PBXs, running a variety of disparate protocols, to their networks. GroomerII, operating as a single call routing platform, simultaneously performing the necessary multiple protocol conversions, is employed to connect and route all calls to the provider's network.

### Flexible call routing

The inherent flexibility of GroomerII's call routing capability provides full arbitrary routing across multiple incoming trunks and groups to an outgoing IP group (or TDM trunks/groups). This also enables routing, to and from a prime communications link, for overflow or fallback to a PSTN link, or for least cost routing, with or without call concentration.

### CLI-based routing

CLI-based routing can be used if needed to route calls from an authorised or registered user only; if a call is authorised the onward routing is determined by GroomerII's routing tables or an external ODBC database.

### DDI-based routing

DDI-based routing is used in one of two ways on a route-by-route basis. Typically used to prevent access to premium rate or inquiry numbers, it can equally be used to allow access only to certain numbers based on the dialed destination number – DDI (DNIS) or IP phone number/address.

### Least cost routing

Least cost routing means calls may be transparently re-routed across specified lower cost routing centres via public or private, TDM and IP networks. This is often used together with time-of-day scheduling as schedules to change routing databases can be implemented, with new tables activated at different times of the day or days of week (e.g., during peak hours or at weekends). This feature allows GroomerII to route to alternative TDM or IP destinations dependent on the time when the call was placed.

### Multi-port concentration

Multi-port concentration means a number of incoming timeslots on different trunks, perhaps with different published directory numbers, can be routed to a single outgoing trunk or IP group on GroomerII. This arrangement is often used to front contact centre traffic, and economically uses a single answering point – GroomerII – for many different campaign numbers.

### TDM number translation

GroomerII's configuration options provide users with the ability to manipulate several parameters within the calling setup message. Number translation, using parameters such as CLI (ANI) or DDI (DNIS), underpins GroomerII's ability to perform least cost routing and many other useful operations. For example, GroomerII can be used to differentiate between call traffic from multiple customers to a contact centre, or for revenue generating applications using toll paid or premium rate numbers.

With number translation, the outgoing route, in either direction, can be determined by matching one or several of these parameters. They include: CLI (ANI), and DDI (DNIS) – A and B numbers; service indicator code (SIC) – 64k data, 3khz, fax, or speech; bearer capability; numbering type – international, national or network specific; and plan – private, telex, data, or ISDN.

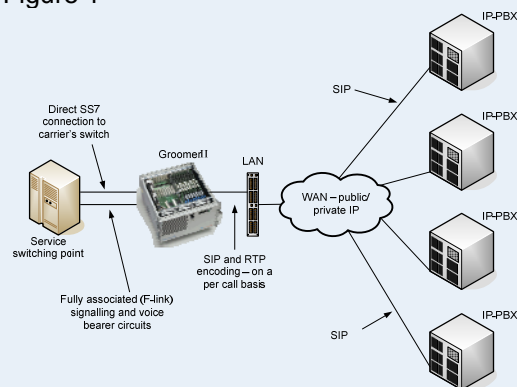
### IP address translation

When GroomerII is used for outbound calls via an IP network, address translation is typically achieved via 3rd party SIP Proxy server interactions. For calls to IP-PBXs, such as illustrated in figure 1, a look-up table (user populated database) within GroomerII is used for local routing of IP calls, enabling users to implement flexible routing and service provision options.

In this scenario, an alternative carrier or service provider wants to be able to offer their customers, who may be using a variety of IP-PBXs employing e.g., a SIP connection to their network.

Solution: the carrier can use GroomerII to accept incoming IP calls, using SIP (on a per call basis) and establish outgoing calls over the SS7 network to the carrier's switch. Calls from the network to the IP-PBXs are similarly handled.

Figure 1



### External database connectivity

For larger, external customer databases, GroomerII's database connectivity function, via an ODBC interface, can be used to perform complex queries, allowing number lists of 100 000+ entries to be checked as part of the routing function. GroomerII users with application needs for number portability and routing based on CLI (ANI) or DDI (DNIS) will find this functionality extremely useful.

In conjunction with database connectivity, routing based on CLI (ANI) numbers can be used to bar, route or re-route specified calls based on the incoming CLI (ANI). Similarly, it can be used to route calls based on DDI (DNIS) numbers. If the routing of a call is declined a cause code can be returned. These functions can be used to implement 'go/no-go' lists.

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This function also enables number portability (DDI substitution), which can be used to provide a cost-effective call re-routing service for location independent calls placed initially to a fixed line DDI number or IP phone. Routing is enabled on a port by port basis to the appropriate destination based on a database look-up.

ODBC support is available for most popular database products allowing complex queries to be performed on existing customer data systems. Using an external database simplifies the import/export of data and ensures up to date and accurate information is available to all networked GroomerIIs.

### SIP call balancing

In a typical scenario, GroomerII can be used to front-end an IP platform such as a network-based IVR for a mobile telco. For reasons of capacity and redundancy, the IVR platform is often comprised of multiple servers, reached via a single number. SIP balancing means that calls can be distributed across these multiple end points on a round-robin basis. This ensures equitable load sharing between servers in addition to congestion handling. GroomerII uses the SIP OPTIONS message to poll and maintain an active/busy status per IVR server. A configuration option also enables this function to operate in a fallback mode.

### IP voicemail routing

GroomerII offers unique interworking functionality for carriers or CLECs deploying IP-based equipment such as voicemail. It solves the problem of how to successfully route a call, forwarded from the PSTN, to the appropriate IP mailbox by translating the original dialled number to a diversion header within an outgoing SIP INVITE.

### Protocol conversion with a signalling and media gateway

In today's networks, where elements of fixed and mobile communications have substantially converged and the move to next generation IP architectures has become more common, there remains a fundamental need for interconnection devices or gateways. A signalling and media gateway performs protocol conversion in both directions to set up a call between two remote end points, and also simultaneously provides the media path conversion between, for example, a TDM stream and an IP/UDP/RTP stream. This functionality is a composition of key elements found in the IMS architecture and explains why GroomerII is described as a stand-alone appliance.

There has always been a need for converting between protocols to enable interworking between equipment with incompatible line interfaces. Whether this has been between Q.931-based ISDN protocols and Q.SIG or DPNSS for ACD and contact centre systems, or from legacy CAS protocols, such as MFC R2 or T1RBS, enabling the connection of enterprise PBXs to provider's ISDN networks, the need has been consistent and ongoing. Now, there is a multitude SIP/RTP networks and end points, with a long term need for PSTN interworking, particularly between SS7 and SIP.

### Connecting TDM and IP networks

GroomerII can be used as a signalling and media gateway connecting TDM and IP networks. Multiple, simultaneous signalling and media conversions between any supported ISDN, CAS or SS7 signalling protocol and SIP, with codec negotiation on a per call basis, are available. And a multi-port configuration, with arbitrary TDM protocols on individual trunks and IP protocols selectable on a per call basis via Ethernet ports, is possible. Beneficially, this means that users no longer need to deploy separate units dedicated to conversion between two protocols only.

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Multiple, simultaneous trunk-to-Ethernet protocol conversions means high capacity applications with large call volumes or traffic throughput can be implemented. Practical Proxy server interoperation also ensures essential compatibility with SIP entities and network elements.

GroomerII will deliver interconnection and protocol conversion between all available protocols, including SS7 and SIP, which has become the predominant call control protocol for VoIP terminals. Conversion between all of the signalling protocols available from Aculab's comprehensive portfolio enables GroomerII to be used in many and varied international applications.

### Dual redundant SS7 signalling

For telco interconnection of SS7 networks, signalling redundancy is often a mandatory requirement. GroomerII fulfils this need with a dual redundant MTP3, either in single chassis or dual chassis mode. In a dual chassis configuration using 'A' or 'F' links, several GroomerIIs can be arranged to operate behind a single network point code. In this way, two GroomerII units provide the signalling connection with, as a minimum, a pair of signalling links, and each GroomerII (two or more) independently handles its media conversions between SS7 and IP.

### For TDM connections

GroomerII systems can be re-configured on-line to change the protocol parameters on any trunk with no loss of service to other trunks in use. Trunks and individual timeslots within trunks may be configured as incoming, outgoing, both-way, or disabled, offering maximum flexibility for trunk group configuration. Information elements within individual protocols are mapped from an incoming to an outgoing trunk to ensure that the fullest possible conversion between protocols is achieved. Support of wholly or partly provisioned trunks is provided and control of timeslot hunting order ensures optimum use of trunk capacity whilst avoiding network access congestion.

### A-law and $\mu$ -law conversion

With A-law and  $\mu$ -law conversion GroomerII overcomes incompatibility between digital speech encoding methods in international E1 and T1 networks. Also, typically, there are differences between the signal levels of international telephone networks, therefore, GroomerII provides for signal gain and attenuation to be individually controlled across call routes.

### Call progress tone generation

GroomerII also incorporates progress tones that can be used to provide flexible conversion between international signalling types. CAS protocols do not provide the same level of call progress information as ISDN signalling systems. During call routing, GroomerII may be configured to generate call progress tones to reflect the progress of the outgoing call. Tone generation can be customised for each routing path according to the call source and its destination port.

Supported call progress tones include: BS (UK) or EC style supervisory tones; New Zealand call progress tones (dial, ringing, busy and unobtainable); and dial tone, special dial tone, ring back, busy, and unobtainable tones.

### Host independent approvals

Aculab has obtained many country specific, host independent regulatory approvals, such that GroomerII can be deployed throughout the world without additional approvals. In regions where this option is not available, Aculab has experience to offer in support of users seeking system level type approvals.

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## Billing applications

Designed with the needs of service providers in mind, GroomerII can generate essential raw billing information. It can be configured to produce call data records (CDRs), which may be collected and processed to provide statistical analysis on calls or generate billing reports.

CDRs can be generated for all signalling types, including for SIP, and contain tracing information on each call made through GroomerII. These records can be written to a disk file for later export to a network management system via the host NIC. They are generated in a number of formats, including a user configurable format, and are typically post processed by a call logging or network management system.

## Resilience and reliability

GroomerII presents a resilient, standards compliant solution and is tested to perform consistently with the highest call throughput. Because downtime means loss of revenue, GroomerII offers several features to ensure high availability and resilience. An SNMP agent monitors the GroomerII application and the use of redundant disks (RAID), and redundant hot swap power supplies, further ensures optimum performance.

Hardware RAID Level 1 is provided with all GroomerII variants. RAID Level 1 performs all writes to two drives as a method for achieving redundancy. This dual disk form of RAID is often called 'mirroring'. If a disk error occurs in one of the RAID members, the on-line mirrored disk drive will automatically take over from the suspect drive. Note that operator intervention is required to restore data when a replacement disk drive is installed.

GroomerII is equipped with an SNMP agent and traps are provided that can be configured to report events affecting the successful operation of the application and host PC to a remote network management system. Comprehensive system diagnostics, including the capture of signalling protocol trace are also provided.

## Remote access

GroomerII can be accessed via the host NIC, which gives TCP/IP (LAN) local access for centralised control of GroomerII (or multiple GroomerIIs) via an SNMP-based network management system. Reconfiguration, maintenance and the downloading of new software and routing files to GroomerII may be performed via the LAN and remote access.

GroomerII (2U; 6U) is fitted with a remote management module (iDRAC/RMM), which enables remote console (KVM) control of the system via a dedicated Ethernet port, for '24 X 7' system support. Using a standard Web browser on a client computer, the administrator is able to see the screen of the remote GroomerII and work with the GroomerII application as if (s)he was seated at the target system with full KVM control. This 'virtual presence' provides convenient and secure, '24 X 7' access to manage GroomerII and independently control power and reset.

## Technical summary

Configuration	GroomerII – 6U	GroomerII – 2U	GroomerII – 1U
<b>System capacity</b>			
IP channels	120 or 240, and multiples up to 1200 maximum	240, 480, 720 or 960	60 or 120
E1/T1 trunk options	4 or 8, and multiples up to 40 maximum	8, 16, 24 or 32	2 or 4
<b>IP interfaces</b>			
LAN protocol and connection – SIP / OAM&P	10/100/1000 Mb BASE-T Ethernet; NIC teaming; 2 x RJ45	10/100/1000 Mb BASE-T Ethernet; NIC teaming; 4 x RJ45	10/100/1000 Mb BASE-T Ethernet; 1 x RJ45
LAN protocol and connection – VoIP traffic	10/100/ Mb BASE-T Ethernet; dual port redundancy; 1 x RJ45 per module		10/100/ Mb BASE-T Ethernet; dual port redundancy; 2 x RJ45
Protocols supported	SIP 2.0; TLS <sup>1&amp;2</sup> ; RTP; SRTP <sup>1&amp;2</sup> ; RTCP; TCP; UDP – contact Aculab for further details		
Voice codecs	G.711; G.723.1A <sup>3</sup> ; G.726; G.729AB <sup>3</sup> – negotiated on a per call basis		
<b>TDM interfaces</b>			
Network line interfaces	E1/T1; software selectable; 75R, 100R, or 120R terminations		
Network connection	4 x RJ45 per module; adapter cables supplied (8 E1/T1 and above); BNC via adaptor UK, ITU-T, China and ANSI ISUP <sup>4</sup> ; MTP3		
SS7 support	Fully or quasi-associated ('A' or 'F' links)		
	Up to 128 links/link sets per local point code; load sharing CIC/timeslot blocking facility		
Legacy ISDN and CAS protocols supported	A wide range of protocols including ETS300; T1RBS; MFC R2; NI-2; DMS100; INS 1500 <sup>5</sup> ; BT DASS2, DPNSS and Q.SIG – see Aculab's website for further details		
<b>Physical and environmental</b>			
Chassis	Open industry standard, 19" rack mountable 6U	Open industry standard, 19" rack mountable 2U	Open industry standard, 19" rack mountable 1U
Chassis dimensions - width, height, depth (excluding handles) <sup>6</sup>	435mm x 263mm x 518mm	444mm x 87.3mm x 684mm	430mm x 45mm x 450mm
Peripherals supplied	Keyboard and mouse		
Power supply	230/115V AC (50/60Hz); quad (n+1) redundant hot swap	-48V DC; 230/115V AC (50/60Hz); dual redundant hot swap	230/115V AC (50/60Hz); dual redundant hot swap
Hot swap RAID Level 1	Standard	Standard	Standard
Power consumption	Maximum in Watts 1050W	320W	150W
Operating environment	Operating temperature (ambient) <sup>7</sup> : 10 to 35°C Humidity: 10 to 80% RH non-condensing		
EMC standard	EN55022/55024; FCC Pt15; ASNZ3548		
Safety standard	CB; IEC950; UL; CUL; NEBS compliant 2U chassis		

### Notes:

1. Export restrictions apply to systems with 'Strong Encryption', please contact your Account Manager for further details.
2. TLS/SRTP available for SIP calls only.
3. Licence fees may be payable to an IPR holder or agent, please contact your Account Manager for more information
4. For availability of other national and international variants, please contact your Account Manager.
5. Release controlled; contact your Account Manager for availability
6. For overall dimensions, allow additional depth for front panel handles and cables at rear.
7. For maximum system configuration.



### GroomerII features summary

• A-law and $\mu$ -law encoding conversion	• Number portability (DDI substitution)
• Any protocol, any trunk	• Number translation (digit manipulation)
• Arbitrary TDM routing, trunk-to-trunk, group-to-group	• PSTN emulation (call clearing)
• Arbitrary IP routing, Ethernet-to-trunk (or group)	• PSTN fallback for IP calls
• Call data records (CDR)	• Remote 'lights out' power and reset control
• Call progress tone generation	• Remote network management; remote (KVM) console <sup>1</sup>
• CAS tone signalling	• SIP call balancing
• CLI (ANI)-based routing	• SIP call recovery (with RTP loss detection)
• Configurable echo cancellation (G.168)	• SIP fallback (destination failover)
• DDI (DNIS)-based routing	• Silent backup
• Dual redundant SS7 configuration ('A' and 'F' links)	• SIP call redirection
• External database connectivity (ODBC)	• SIP History-Info headers
• FTP file upload for routing configuration files	• Status Monitor
• IP address translation	• SNMP V2c support for network management
• IP voicemail routing (using a diversion header)	• Software support available (contract needed)
• Least cost routing (with time-of-day scheduling)	• SS7-to-SIP interworking (Q.1912.5; RFC3398; RFC3325; TSG/SPEC/007 refers)
• Multiple, simultaneous TDM-to-TDM protocol conversions	• Supports wholly or partially provisioned trunks
• Multiple, simultaneous TDM-to-IP conversions	• TCP/IP LAN network access (via NIC)
• Multi-port concentration	• TDM network tones
• NENA/EENA i3 Protocol Interwork Function	• T1 CAMA signalling
• NIC teaming <sup>1</sup>	• Tone regeneration (RFC2833)
• Numbering plans	• Wildcard support for address mapping

**Notes:**

1. Not available on 1U GroomerII variants fitted with 2 or 4 E1/T1 trunks.

For more information, please contact your Account Manager or view our website:  
<http://www.aculab.com>

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