

NETWORK ACQUISITION MODULE



A flexible seismic server, designed to provide a bespoke data-flow system for large arrays, at an affordable price.

The NAM is a stable, robust data hub with unrivalled configurability, ideal for large or complex regional and national arrays and other multi station monitoring solutions.

As a communications hub, the NAM acquires multiple data streams from connected instruments (either local or remote, over serial or IP communications) and acts as both a data store and data transmitter. Additionally, it can deliver real-time protocol conversions to a variety of seismic formats.

For stations where access to GNSS (Global Navigation Satellite Systems) is impractical, the NAM can also operate as a Network Time Protocol (NTP) server, synchronising the remote stations to a local GNSS receiver.

Applications

- > National and regional networked arrays
- > Volcano monitoring arrays
- > Structural health monitoring solutions
- > Borehole
- > Vault

Images show the Güralp NAM

Key features

Stable, robust and flexible for confident long-term deployments with total autonomy

Designed to act as a data concentrator in seismic networks, capable of acquiring data from up to 500 instruments at 100 sps

Control using either Web interface or the console accessed via video, serial or SSH

GCF (Scream!), SEEDlink (SeisComP), CD1.1, GDI-link

Multi-user Linux operating system

Ethernet LAN (10/100/1000Base-T) 802.1q tagged VLAN support

Full TCP/IP support with PPP

LCD display for status information

8 / 16 / 24 RS-232 port expansion options

NAM (MKII)

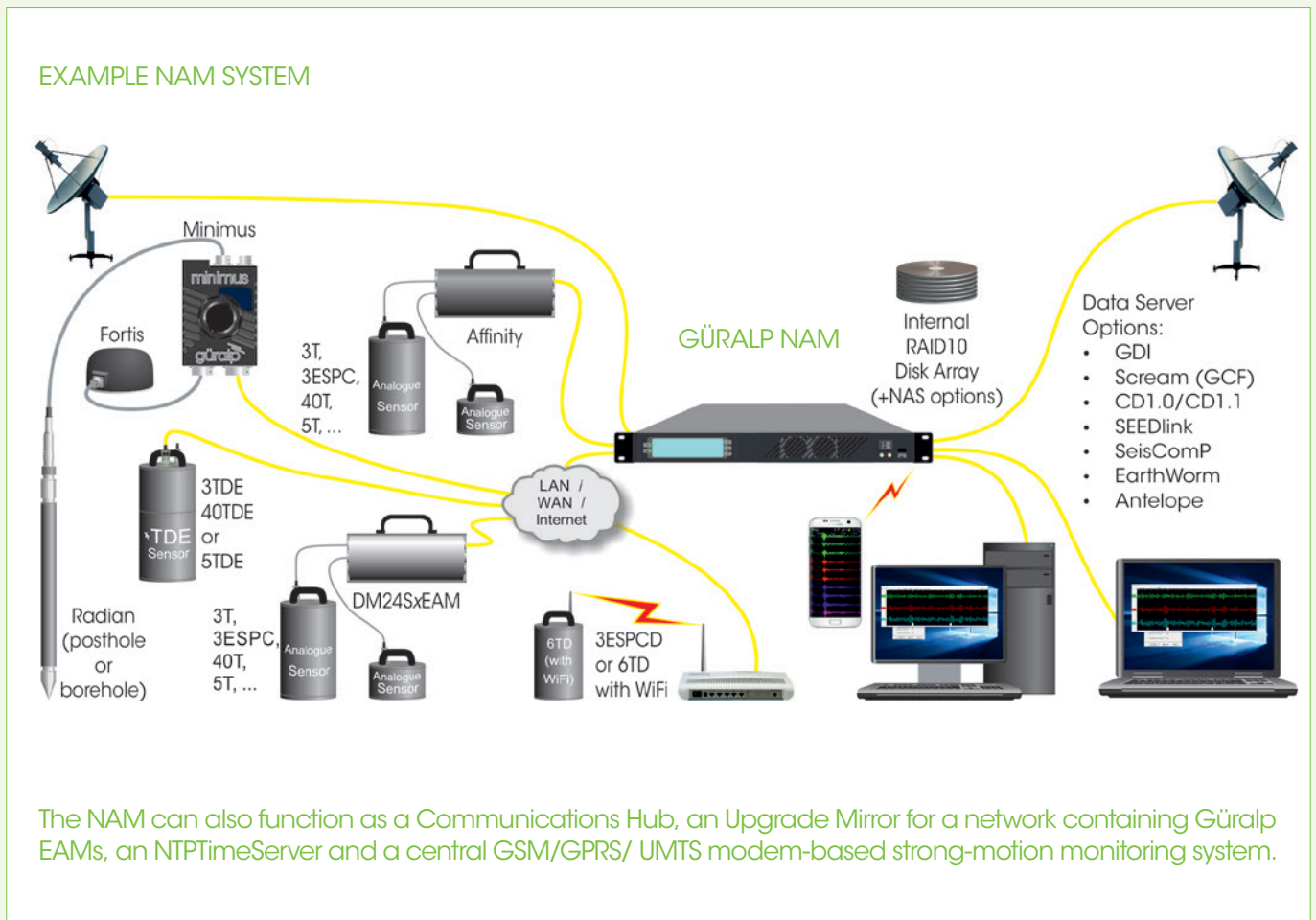
The NAM is a highly configurable system, suitable for multi station applications on all scales.

The NAM acquires data from local and/or remote instruments, digitisers and other systems. Data can be acquired from EAMs and other NAMs functioning as concentrators, allowing complex networks to be assembled with ease.

Directly supported instruments include the Güralp Radian, 3TDE, 40TDE, 5TDE, 6TD and 3ESPCD (with Ethernet option).

The data are stored in GCF and/or miniSEED format onto the integrated SSD. Unlimited external storage via NFS (Network File System) can be utilised if required.

The NAM can also act as a data-server to remote clients, including Scream!, Earthworm and Antelope, using protocols such as GCF, CD1.1, SEEDlink and GDI-link.



Web server interface

The screenshot shows the 'System status' page of the NAM web interface. The left sidebar contains navigation menus for 'Central', 'Tools', 'Configuration', 'Data handling', and 'Networking'. The main content area displays a 'System status' section with various components and their operational status, all indicated by green checkmarks:

- Scream server (GCF network sender)
- System gdi-link receiver
- System gdi-link transmitter
- GCF compressor: Default instance
- Mini-SEED compressor: Default instance
- GSTM server
- NTP
- RAID array /dev/md1
- RAID array /dev/md2
- SEEDlink network server (instance)
- Storage
- Linux system

Below this, a detailed view for the 'Scream server (GCF network sender) — 100%' is shown, including statistics like 'Total number of blocks sent: 2180811 — 100%' and 'Number of clients connected: 2'. Two clients are listed: 'Client #6: TCP Push' (Remote IP: 9.10.20.174, Remote port: 54374) and 'Client #9: TCP Push' (Remote IP: 9.10.20.179).

The NAM provides a secure Web server, giving authorised users access to its configuration options

This screenshot displays the 'Network Interface' configuration page for the 'eth0' interface. The left sidebar is similar to the previous screenshot. The main content area includes:

- Network Interface eth0:** A form to modify configuration for this Ethernet device, with fields for Device name, MAC address, and Description.
- Central Summary:** A smaller version of the system status overview.
- Masses:** A section for managing masses, with buttons for 'Lock masses for recovery and transport' and 'Unlock masses for deployment'.
- Decimator outputs:** A table for configuring decimator outputs. The table has columns for Sample Rate, Highpass filter, and Output (Z, N, E, X, Z2, N2, E2).

Sample Rate	Highpass filter	Z	N	E	X	Z2	N2	E2
Tap 1 100sps	continuous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tap 2 200sps	continuous	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tap 3 2sps	continuous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
- Storage and recording:** A section for configuring storage options, including 'Storage device' (MiniSEED, GCF, Non-seismic data, NFS, Advanced), 'GCF' (Enabled), 'File period' (30 minutes), 'File name' template, 'Flush threshold' (50%), and 'GCF compressor' (GCF compressor: Default instance).

The NAM has extended options for network and serial interfaces, including PPP support. Without rebooting, you can configure any serial port to input or output GCF data, communicate with modems, or provide access to the Linux shell.

Through the NAM, administrators can configure or control Güralp digitisers and digital instruments from anywhere on the network.

The NAM is fully compatible with Scream! software, and can gather data from Scream! servers or send to clients as desired. The NAM supports other formats such as SEEDlink and CD1.1.

The NAM records directly to disk in GCF and/or miniSEED format. External (NAS) RAID is supported for additional resilience and performance.

SPECIFICATIONS

SOFTWARE	
Operating system	Linux
COMMUNICATION PROTOCOLS	
Interfaces / Connections	Serial (RS232, RS422, USB), Ethernet (10/100/1000BASE-T)
Internet technologies supported	TCP/IP, PPP, HTTP, HTTPS server and client, SSH, RSYNC, SCP Firewall and routing capabilities
DATA FORMATS	
Data recording	GCF, miniSEED
Data streaming protocols	GCF (Scream!), SEEDlink (SeisComP), CD1.1, GDI-link
Internal storage	Solid state (SSD) Hot swappable, journaling filing system Optional NAS storage expander for up to 12 TB of storage over four disks
External storage	Unlimited capacity via NFS
OPERATION AND POWER USAGE	
Power supply voltage	100-240 V AC 50-60 Hz
Power consumption	14.4 W with Ethernet
ENVIRONMENTAL / PHYSICAL	
Operating temperature range	+5 °C to +55 °C
Dimensions height × width × depth	44 mm × 483 mm × 230 mm (1u, 19" rack mounted)
Ports:	2 x Ethernet ports (1000BASE-T) 2 x RS232 1 x RS422 4 x USB 1 x Console (RS232) 1 x PS2 keyboard socket 1 x VGA/DVI display Optional serial port expander for 8, 16 or 24 RS232 ports using one USB connection
SUPPORTING DOCUMENTATION	
Manual	Available online at: www.guralp.com/documents/MAN-EAM-0003.pdf