

LAN • GOV User's Guide



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FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE - Shielded ethernet cables must be used with the Engage LAN•GOV to ensure compliance with FCC Part 15 Class A limits.

CAUTION – To reduce the risk of fire, use only No. 26 AWG or larger listed Telecommunication cables.

Equipment Malfunction

If trouble is experienced with an LAN•GOV, please contact the Engage Communication Service Center. If the equipment is causing harm to the telephone network, the telecommunications service provider may request that you disconnect the equipment until the problem is resolved.

Engage Communication Service Center:

Phone (U.S.)	831-688-1021
Fax	831-688-1421
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Web	www.engagecom.com

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Chapter 1

Introduction

The LAN•GOV User's Guide provides the information users require to install and operate the LAN•GOV developed and manufactured by Engage Communication, Inc.

LAN • GOV

The LAN•GOV is used to interconnect Ethernet LANs through a data rate governor. The data rate governor utilizes Time Division Multiplexing based clocking to provide for Nx64, NxT1 and NxE1 bandwidth regulation that is configurable from 64 kilobits up to DS3. Governing the WAN bandwidth utilized by an Ethernet LAN enables the reservation of WAN bandwidth for time sensitive real time connections such as those required by Video Conferencing, Voice Over IP and TDM Over IP applications.

Transparent Interconnect

The LAN•GOV transparently monitors all the packet traffic on each of its LAN segments to determine whether the packets it receives are to be forwarded. The Ethernet MAC layer source addresses that are active on each LAN are stored in a filtering database. Packets with a MAC destination that do not match a MAC address entry for the receiving port are forwarded.

LAN Interface

- Two 10/100 BaseT Full/Half duplex Ethernet interfaces
- Autonegotiation or Configurable Speed and Duplex

About this Guide

Organization

Chapter 1 - Introduction provides an overview of the *LAN•GOV User's Guide* as well as feature descriptions for the LAN•GOV.

Chapter 2 - QuickStart provides concise configuration examples to get the experienced user up and running in the minimum time.

Chapter 3 - Installation covers the physical environment and connections required when first installing the LAN•GOV.

Chapter 4 - Command Line Reference provides a command-by-command description of the Engage CLI.

Chapter 5 - Configuration and Operation discusses the initial configuration and ongoing operation of the LAN•GOV.

Chapter 6 - Troubleshooting common problems occurring during installation and normal operation.

Appendices - LAN•GOV specifications, connector pinouts and crossover wiring details.

Glossary - Routing, Telecommunication and TCP/IP terminology.

Intended Audience

This manual is intended for administrators of network and telecommunication systems. The technical content is written for readers who have basic computer, telecommunication and networking experience.

It is important that any administrator responsible for the installation and operation of Engage LAN•GOV products be familiar with IP networking and data communication concepts and terms. These terms are central to an understanding of LAN•GOV functionality, and are covered in the Glossary section.

Chapter 2

Installation QuickStart

This QuickStart Chapter is intended for users who understand how they want their LAN•GOV configured and only require the mechanics of performing that configuration.

LAV•GOV Basics

The LANGOV has two 10/100BaseT Ethernet ports. They are labeled LAN 1 and LAN 2 on the LANGOV front panel. It is important to note that the two interfaces are independent network processors and are configured separately.

Each network processor has a console port. They are labeled Console 1 and Console 2 on the LANGOV front panel. Console 1 is used to configure the LAN 1 port and Console 2 is used to configure the LAN 2 port. Initial communication with the IP•Tube is made through the Console ports utilizing the Command Line interface detailed in *Chapter 4: Command Line Interface*.

The Command Line Interface, identical for each network processor, refers to a LAN1 interface and a RATELIMITER interface. The LAN1 interface represents the Ethernet port on the network processor and the RATELIMITER interface represents the internal rate limiting function. Note that since the Command Line Interface is identical for both network processors, when configuring the Ethernet port for LAN 2 from Console Port 2 the Command Line Interface will refer to an interface named LAN1.

When reviewing the configuration information below, remember the configuration must be made to *both* network processors.

Communication with the LAN•GOV

Console Port

Initial communication with the LAN•GOV is made through a Console port, utilizing the Command Line interface detailed in *Chapter 4: Command Line Interface*. Communication to a Console port should be set as: 9600 baud, 1 stop bit, no parity, 8 bit fixed.

There are two network processors on the LAN•GOV and each has a Console port. Communication must be made to both Console ports for correct operation of the LAN•GOV.

The Console port on the LAN•GOV is an RJ45 jack. The Console port is configured as a DTE port. An RJ45/db9 adapter is provided with the LAN•GOV which, in addition to providing a physical interface, performs the null modem operation permitting direct connection to other DTE equipment, such as the COM1 connection of a PC.

Once a serial connection between a workstation and a LAN•GOV Console port is established and a carriage return <CR> is entered, a Login prompt will appear.

The default login is: **root**.

Telnet

Once an IP address has been assigned to a LAN•GOV Ethernet interface, the user can telnet into the LAN•GOV and continue configuration using the Command Line Interface.

There are two network processors on the LAN•GOV and each has an Ethernet port. An IP address must be assigned to the Ethernet interface of both network processors to telnet into each network processor and continue configuration.

Editing & Pasting Configurations

Users of the Command Line Interface have the option of editing standard LAN•GOV configurations in text-only mode and pasting that configuration to the LAN•GOV.

Edit the desired configuration listing using a simple text editor. Connect to a LAN•GOV network processor through Telnet or the Console port,

then enter the configuration mode with the command: **config**

Paste the edited text, comments and all, to the LAN•GOV, then issue the command: **save**. The LAN•GOV network processor will reset and come up with the new configuration.

Repeat the configuration, if necessary, for the other LAN•GOV network processor.

To save an LAN•GOV network processor configuration, issue the command: **show config all** and save the response listing to a file.

LAN•GOV Cabling

The LAN•GOV uses standard 10/100BaseT Ethernet cabling to connect to an ethernet switch or hub. A crossover 10/100BaseT cable can be used for direct connection to a single router, wireless radio or other ethernet device.

LAN•GOV Configuration Parameters

The setup of the LAN•GOV involves configuration of the:

- LAN•GOV System Parameters
- Interface Specific (LAN1/RATELIMITER) Parameters

Examples are provided in this QuickStart and a complete description of all commands is available in *Chapter 4: Command Line Interface*.

LAN•GOV System Parameters

System parameters include the LAN•GOV Hostname, the Ethernet IP address, the default router, and Spanning Tree. Examples:

LAN•GOV Host Name

Provide a unique name for the LAN•GOV.

```
HOSTNAME LANGovernor
```

Ethernet IP address

Assigning an IP address is required for telnet configuration or testing connectivity with ping. For the ethernet interface, first specify INT LAN1.

IP ADDRESS aaa.bbb.ccc.ddd

LAN•GOV Default Router

If the telnet host resides on a different IP network from the LAN•GOV, a default router must be specified.

IP DEFAULT-ROUTER aaa.bbb.ccc.ddd

Spanning Tree

Enables or disables IEEE 802.1 Spanning Tree bridging on both interfaces. Turn this on if there is another bridge on the network with an IEEE 802.1 Spanning Tree.

LAN1 Interface Parameters

The LAN•GOV has LAN1 interface commands to set up the Ethernet port for Auto-negotiation or duplex mode and bit rate.

Auto Negotiation

Enable or disable IEEE 802.3 Auto-negotiation on the Ethernet interface. Warning: If the device connected to LAN1 uses Auto Negotiation and LAN1 is configured to use full duplex without Auto Negotiation, the other device may operate in half duplex mode by default and successful operation cannot be guaranteed.

AUTONEGOTIATION {ON|OFF}

Duplex

Set the duplex mode for the Ethernet interface. This command only takes effect when Auto-negotiation is configured to OFF. Warning: If the device connected to LAN1 uses Auto Negotiation and LAN1 is configured to use full duplex without Auto Negotiation, the other device may operate in half duplex mode by default and successful operation cannot be guaranteed.

DUPLEX {HALF|FULL}

Speed

Set the line rate in Mbps for the Ethernet interface. This command only takes effect when Auto-negotiation is configured to OFF.

```
SPEED {10|100}
```

RATELIMITER Interface Parameters

The RATELIMITER interface parameters determine the rate limiting function of the LANGOV. The rate limiting function is configured for only one direction, from the Ethernet receive of this network processor to the Ethernet transmit of the other network processor. To configure the other direction, you must configure the other network processor.

Rate Limit Mode

This determines the scaling factor by which to limit the committed information rate across the LANGOV. For example, a RATELIMIT MODE of NX64K will configure a committed information rate in 64Kbps increments. A RATELIMIT MODE of NXT1 will configure a committed information rate in increments of a T1 rate or 1,544Kbps. A RATELIMIT MODE of NXE1 will configure a committed information rate in increments of an E1 rate or 2,048Kbps.

```
RATELIMIT MODE {NX64K|NXT1|NXE1}
```

Rate Limit Factor

Choose a RATELIMIT FACTOR that when multiplied by the RATELIMIT MODE gives the desired committed information rate.

```
RATELIMIT FACTOR NN
```

Example Configuration

LAN•GOV configuration is detailed in this section. The command line configuration listing is shown for an example. The configuration commands are defined in *Chapter 4: Command Line Interface*.

**Example 1: LAN•GOV Bi-Directional
Rate Limiting at 21.616 Mbps****Scenario**

This sample configuration details an IP•Tube Rate Limiting at 21.616.Mbps. To complete the configuration, both the LAN 1 and LAN 2 ports are configured. The rate limiting is bi-directional, so the configuration is identical for each port.

Command Line Listing for Configuration of Port LAN 1

```
HostName LANGovernor  
Spanning Tree Off
```

```
Interface LAN1  
Auto Negotiation On  
IP Address 192.168.1.3/24
```

```
Interface RATELIMITER  
Rate Limit Mode    NXT1  
Rate Limit Factor  14
```

Command Line Listing for Configuration of Port LAN 2

```
HostName LANGovernor  
Spanning Tree Off
```

```
Interface LAN1  
Auto Negotiation On  
IP Address 192.168.1.4/24
```

```
Interface RATELIMITER  
Rate Limit Mode    NXT1  
Rate Limit Factor  14
```


Chapter 3

Installation of the LAN • GOV

This chapter provides details on the physical connections required for the installation of Engage LAN•GOV equipment. Also covered is the initial communication with the LAN•GOV.

References are made to the Configuration and Operation of the LAN•GOV as well as to the Command Line Interface. These topics are covered in detail in later chapters.

Installation Requirements

The use of Engage LAN•GOV systems to create a data rate governor requires one LAN•GOV between the points to be governed.

A standard LAN•GOV package includes:

- LAN•GOV unit
- Console port adapter and cable
- Power Converter (110 or 220 Vac input/15 Vac or 15 Vdc output)

Installing the Hardware

Locating the LAN • GOV

Site consideration is important for proper operation of the LAN•GOV. The user should install the unit in an environment providing:

- A well-ventilated indoor location
- Access within six feet of a power outlet

- Two feet additional clearance around the unit to permit easy cabling connection

As an option, the LAN•GOV can be mounted in a standard 19 inch equipment rack (rack mounts are available from Engage)

Powering the LAN•GOV

Engage LAN•GOV units utilize an external power adapter, available in 110 VAC and 220 VAC versions, providing AC output.

The appropriate power adapter is provided with each unit.

- Ensure the power adapter is not connected to power.
- Plug the AC adapter into the circular rear panel POWER connector.

Connect the power adapter to an appropriate AC power outlet and check the PWR LED on the front panel of the Engage LAN•GOV. The PWR LED will be GREEN when the internal diagnostics have completed

Console Ports

All LAN•GOV models include two Console ports for configuration. The Console ports may be used for serial communication from a local workstation, or for remote connection via a modem. The Console ports are labeled Console 1 and Console 2 on the front panel.

LAN•GOV models utilize an RJ45 jack for a Console port. A Console port is configured as a DTE (data terminal equipment) port. This allows direct connection to a DCE (data communication equipment) device such as a modem. For connection to other DTE, such as a terminal or PC, a Null Modem adapter is required.

An RJ45 to db9 adapter is provided with the LAN•GOV which, in addition to providing a physical interface, performs the null modem operation permitting direct connection to other DTE equipment, such as the COM1 interface of a PC.

Pinouts for a Console port, as well as Engage supplied adapters, are provided in the Appendices.

Communication to a console port should be set for:

9600 baud, 1 stop bit, no parity, 8 bit fixed

Once a serial connection between a workstation and a LAN•GOV Console port is established and a carriage return <CR> is entered, a Login prompt will appear.

The default login is: **root**.

Configuring the Engage LAN•GOV for the LAN

The LAN•GOV needs to be configured with a number of parameters for proper operation in the network including:

- Ethernet autonegotiation
- Rate limiting functions
- for telnet or ping test: ethernet IP address, subnet mask, and default gateway

The configuration procedure depends on the network environment in which the LAN•GOV is to be installed.

Note: It is strongly suggested that you configure the LAN•GOV with its unique network identity **before** making any ethernet connections for configuration or ping test.

Ethernet Interface

Engage LAN•GOV systems utilize 10/100BaseT ethernet to connect to the Local Area Network. Each system provides two 10/100BaseT interfaces on the front panel for connection to an ethernet switch or hub using a straight-thru ethernet patch cable. For direct connection to a PC or other LAN device, the user should obtain a 10/100BaseT crossover cable.

10/100BaseT Ethernet cabling and crossover pinouts are provided in the Appendices.

Status LEDs

Front panel LEDs provide System and Ethernet status.

Power - The PWR LEDs will be green when the internal diagnostics have completed.

Ethernet

FDX on indicates full duplex, off half duplex.

LNK on indicates good link status.

TD on indicates packet transmission.

RD on indicates packet reception.

Internal DIP Switches.

LAN•GOV systems contain an internal four position DIP Switch which is accessible by removing the unit rear panel and sliding out the network processor.

The default setting for all DIP switches is **OFF**.

Switch 1 - Powering cycling the unit with DIP Switch 1 ON forces the LAN•GOV to return to factory default settings. Factory settings include operation from Base Flash and deleting any download upgrades. Ensure Switch 1 is returned to the OFF position after clearing an upgrade so future upgrades can be performed successfully.

Switch 2 - On executes full diagnostics at power on. The default is off, which reduces start up time.

Switch 3 - Not used.

Switch 4 - Not used.

Chapter 4

Command Line Interface

Command Line access to a LAN•GOV network processor may be made via a Telnet connection to the ethernet interface or via a serial connection to the Console port.

Telnet, part of the TCP/IP Protocol Suite, provides a general communications facility defining a standard method of interfacing terminal devices to each other. Any standard Telnet application can be used to communicate to an Engage LAN•GOV provided there is IP connectivity between the User Host and the LAN•GOV.

For communication through the Console port, standard terminal communication software is used. The console port may be used to communicate with the LAN•GOV locally through a terminal, or remotely by dialing in through a modem.

Console Communication

Serial communication to the console port should be configured for

9600 baud, 1 stop bit, no parity, 8 bit fixed

The console port is an RJ45 jack and an appropriate cable and adapter are provided with the LAN•GOV for use with standard 9 pin COM ports

The RJ45 console port is configured as a DTE (data terminal equipment) port. This allows direct connection to a DCE (data communication equipment) device such as a modem. For connection to other DTE, such as a terminal, a Null Modem adapter is required.

The RJ45 to DB9 adapter which is provided with the LAN•GOV serves this null modem function, permitting direct connection to the COM1 interface of most PCs.

Logging in to the LAN•GOV

A Telnet session is opened by providing the IP address of the LAN•GOV network processor. On opening a CLI session, via Telnet or the Console port, the **login** prompt requires entry of a login ID.

The default login ID: **root**.

The LAN•GOV is shipped with no password set. Passwords are set or modified with the **passwd** command, detailed below.

Overview of Commands

The Engage CLI supports shorthand character entry. At most 3 characters are required for the parsing of the commands. For example: **show configuration** can be entered as: **sh con**. The CLI is not case sensitive. Description of the commands uses both upper and lower case for syntax definitions and examples.

A full description of the command line interface follows.

Categories

The command set can be divided into four categories:

- General**
- Show**
- Config**
- Config Interface**

Online Help

Included in the General commands is the **HELP** command, providing information on the entire command set.

Configuration Modes

For the Config and Config Interface commands, Engage employs a modal approach. The user enters the Config mode, makes changes, then Saves those changes. On Saving the changes the user leaves the Config mode.

The Config Interface mode, within the Config mode, is used to set parameters for a specified interface. Once in the Configuration mode, the user enters the INTERFACE command. All subsequent commands apply to the specified interface.

The command prompt indicates the mode of operation:

name# the single “#” indicates standard Telnet mode

name## indicates the LAN•GOV is in the Config mode

name(lan1)## LAN•GOV is in Config Interface mode for interface LAN1

To move up one level, from Interface Config mode to Config mode, enter the **interface** with no argument. To change between interfaces when in Interface Config mode, specify the new interface. For example:

name(lan1)## **interface ratelimiter**

Syntax for Command Parameters

{ } == one of the parameters in set is required

[] == one of the parameters in set is allowed (optional)

Show Config All

The SHOW CONFIG ALL command, outlined below, provides the means to store and replay an entire configuration. Using a cut and paste operation, configurations may be edited off-line and stored.

System Level Commands

PASSWD

Allows setting or modifying the login password. The LAN•GOV ships with no password set. On entering the **passwd** command, the user is prompted to enter, and confirm, the new password.

BYE|QUIT|LOGOUT

Any of these commands will terminate the Telnet session. If you have unsaved configuration changes, you will be prompted to save or discard the new configuration.

RESET

Resets the LAN•GOV.

HELP [HELP|ALL|CONFIG|SHOW]

Provides Help information on a selected list of topics. Typing **help** with no argument provides the Help summary screen which is the top-level list of commands.

CLEAR {LAN1|RATELIMITER}

Clears the port statistics on the selected port: Ethernet or Rate Limiter.

TERMNN

Allows the user to tailor the number of display lines to their terminal screen size

PING {dest.address} [src.address] [number|spray]

Sends an ICMP ECHO message to the specified address. Any source address from an interface on the IP•Tube can be used. This can be useful to test routes across a LAN or WAN interface.

By default, only 1 message (packet) is sent. A numeric value can be entered to send more than one message. Also, SPRAY can be used to continually send messages until the ESC key is pressed.

UPGRADE {TFTP Server Addr} {Filename}

TFTP (trivial file transfer protocol) provides a means for upgrading LAN•GOV firmware in a TCP/IP environment. A TFTP upgrade may be accomplished over the Internet from a user configured TFTP server. Firmware upgrades and TFTP server software can be obtained from Engage Technical Support (support@engagecom.com).

Ensure IP connectivity between the LAN•GOV and the TFTP server by pinging from one to the other. Then issue the upgrade command.

Example:

```
UPGRADE 157.22.234.129 langov237211.upg
```

Configure a local TFTP server with this file and upgrade with the local server's address.

Note that an LAN•GOV which is running an upgrade must go through two resets when performing an upgrade. This may cause a Telnet connection to drop. If this occurs, simply re-establish the Telnet connection.

SHOW Commands**SHOW [INTERFACE [LAN1|RATELIMITER]] {INFO|STATISTICS}**

Provides details on the LAN or rate limiter interface. If no interface is specified, either the current interface per “interface” command will be used, or all interfaces will be shown.

INFO details the interface type and state

STATISTICS lists the packets transmitted, received, etc.

The LAN1 statistics are packets transmitted and received on the LAN 1 (or 2) ethernet port. The RATELIMITER statistics are packets transmitted and received on the internal interface to the other network processor.

SHOW ROUTER provides general configuration and status information, including the ethernet hardware address and the firmware version.

SHOW IP STATISTICS provides more detailed statistics on IP packets only.

SHOW CONFIG ALL provides a list of all configuration parameters. No argument is the same as ALL. This list provides the basis for storing an LAN•GOV configuration into a local text file. The full configuration can be edited offline.

SHOW CONFIG INTERFACE [LAN1|RATELIMITER]

If no interface is specified, either the current interface per the “interface” command will be used, or all interfaces will be shown.

SHOW CONFIG IP [ALL] displays the IP default router

SHOW CONFIG ROUTER lists LAN•GOV Hostname, etc.

CONFIGURATION Commands

Engage employs a modal approach to LAN•GOV configuration. The user enters the Configuration mode, makes changes, then Saves those changes. On Saving the changes the user leaves the Configuration mode.

A further mode, within the Configuration mode, is used to set parameters for a specified interface. Once in the Configuration mode, the user enters the Interface command. All subsequent commands apply to the specified interface.

The Telnet prompt indicates the mode of operation as follows:

name# the single “#” indicates standard Telnet mode

name## indicates the LAN•GOV is in the Config mode

name (lan1)## LAN•GOV is in Config Interface mode for interface LAN1

CONFIG

Enter the configuration mode, at which point the following commands may be used:

SAVE

Save the changes and exit Configuration mode

END[SAVE]

Exit Configuration mode. The optional SAVE instructs the LAN•GOV to

save configuration changes.

RESTORE

Restores the current LAN•GOV configuration, ignoring any changes which have been made during the current Telnet CONFIG session.

HOSTNAME namestring

Provide a unique name for the LAN•GOV. The new host name does not take effect until a save and reset is performed. For example:

```
HOST NAME LANGovernor
```

IPDEFAULT-ROUTERaddress

Enter the IP address of the default router or gateway. This must be an IP address on the same network as the LAN•GOV ethernet interface.

Config Interface Commands

Configuration of the LAN•GOV involves setting parameters for the ethernet (LAN1) interface and the rate limiter (RATELIMITER) interface. The user must specify which interface is being configured with the command:

INTERFACE [LAN1|RATELIMITER]

To move up one level, from Interface Config mode to Config mode, enter the **interface** with no argument. To change between interfaces when in Interface Config mode, specify the new interface. For example:

```
name(ratelimiter)## interface lan1
```

To move up one level, from CONFIG INTERFACE mode to CONFIG mode, enter the command **INTERFACE** with no argument.

Ethernet Interface

AUTONEGOTIATION {ON|OFF}

Enable or disable IEEE 802.3 Auto-negotiation on the Ethernet interface. Warning: If the device connected to LAN1 uses Auto Negotiation and LAN1 is configured to use full duplex without Auto-Negotiation, the other device may operate in half duplex mode by default and successful operation cannot be guaranteed.

DUPLEX {HALF|FULL}

Sets the duplex mode for the Ethernet interface. This command only takes effect when Auto-negotiation is configured to OFF. Warning: If the device connected to LAN1 uses Auto-Negotiation and LAN1 is configured to use full duplex without Auto-Negotiation, the other device may operate in half duplex mode by default and successful operation cannot be guaranteed.

SPEED {10 | 100}

Sets the line rate in Mbps for the Ethernet interface. This command only takes effect when Auto-negotiation is configured to OFF.

IP ADDRESS address[/mask]

The interface IP address and subnet mask are required for configuration with telnet or connectivity tests with ping. The subnet mask can be entered in long or short form. Examples:

```
IP ADDRESS 192.168.1.1/255.255.255.0
```

```
IP ADDRESS 192.168.1.1/24
```

IP BROADCAST [ONES|ZEROS|DIRECTED]

Assigns IP broadcast address for the Ethernet port. ONES assigns a broadcast address of 255.255.255.255, which is the default on most networks. ZEROS assigns a broadcast address of 0.0.0.0. DIRECTED assigns a broadcast address which is a multicast of the network address for the Ethernet port. For example, if the network address is 10.x.x.x, a directed broadcast address would be 10.255.255.255. Example:

```
IP BROADCAST ONES
```

Rate Limiter Interface**SPANNINGTREE {ON|OFF}**

Enables or disables IEEE 802.1 Spanning Tree bridging on both interfaces. Turn this on if there is another bridge on the network with an IEEE 802.1 Spanning Tree.

RATELIMIT MODE {NX64K |NXT1|NXE1}

This determines the scaling factor by which to limit the committed information rate

across the LANGOV. For example, a RATELIMIT MODE of NX64K will configure a committed information rate in 64Kbps increments. A RATELIMIT MODE of NXT1 will configure a committed information rate in increments of a T1 rate or 1,544Kbps. A RATELIMIT MODE of NXE1 will configure a committed information rate in increments of an E1 rate or 2,048Kbps.

RATELIMIT FACTOR NN

Choose a RATELIMIT FACTOR that when multiplied by the RATELIMIT MODE gives the desired committed information rate.

Chapter 5

LAN•GOV : Configuration & Operation

This chapter provides operational theory and configuration details for the LAN•GOV.

LAN•GOV Installation Steps

The process of installing a LAN•GOV involves the following steps:

1. Planning for LAN•GOV interconnect
2. Installing the IP•Tube hardware
3. System Configuration
4. Rate Limiter Configuration
5. Making 10/100BaseT ethernet cabling connections
6. Verifying the LAN•GOV connection

Planning and Installation

Planning includes site considerations, power requirements, and connection into a network. See *Chapter 3: Installation* for specific requirements.

System Configuration

The rate limiting functions of the LAN•GOV can be configured through the Console ports. If a telnet session is to be used to configure the

LAN•GOV, then the Console ports must be used to configure an IP address for each network processor so that a telnet session can be initiated. In addition, system readiness and connectivity can be tested with ping if an IP address is configured.

Initial configuration items include the hostname for the specific IP•Tube, as well as a login password. The hostname is useful for identifying a LAN•GOV when logged into a CLI session. See *Chapter 4: Command Line Interface* for specific syntax requirements. Examples:

HOST NAME LANGovernor

PASSWD <cr>

An IP default router should be defined if the LAN•GOV being configured is on a different IP network than the telnet host:

IPDEFAULT-ROUTER 172.16.1.1

The LAN•GOV IP address is configured:

INTERFACE lan1

IP ADDR 192.168.1.100/24

The configuration must be performed on each network processor in order to obtain telnet and ping connectivity for that processor.

Rate Limiter Configuration

The rate limiter interface commands are configured by first selecting the rate limiter interface.

INT RATELIMITER

Enable or disable IEEE 802.1 Spanning Tree bridging. Enable only if there is another bridge on the network with an IEEE 802.1 Spanning Tree.

SPANNINGTREE {OFF| ON}

Determine the desired committed information rate across the LAN•GOV. Then select a RATELIMIT MODE and RATELIMIT FACTOR that gives the desired committed information rate. The committed information rate is

the RATELIMIT MODE times the RATELIMIT FACTOR, or CIR = RATELIMIT MODE * RATELIMIT FACTOR.

RATELIMITMODE {NX64K|NXT1|NXE1}

- NX64K = 64Kbps
- NXT1 = 1,544Kbps
- NXE1 = 2,048Kbps

RATELIMITFACTORNN

Choose a RATELIMIT FACTOR that when multiplied by the RATELIMIT MODE gives the desired committed information rate.

A table is shown below with the various combinations of committed information rate, RATELIMIT MODE, and RATELIMIT FACTOR.

RATELIMIT MODE	RATELIMIT FACTOR	Committed Information Rate (Kbps)
NX64K	1	64
NX64K	2-30	128-1,920
NX64K	31	1,984
NXT1	1	1,544
NXT1	2-27	3,088-41,688
NXT1	28	43,232
NXE1	1	2,048
NXE1	2-20	4,096-40,960
NXE1	21	43,008

Table 1 - Committed Information Rate Given Ratelimit Mode and Ratelimit Factor

The rate limiting function is configured for only one direction, from the Ethernet receive of one network processor to the Ethernet transmit of the other network processor. To rate limit the transmit direction on one network processor, you must configure the rate limit function of the other network processor.

For example, if you wish to rate limit the Ethernet transmit of the network processor on the LAN 2 port, you must configure RATELIMIT FACTOR and RATELIMIT MODE for the network processor on the LAN 1 port.

LAN•GOV Cabling

The LAN•GOV uses standard 10/100BaseT Ethernet cabling to connect to an Ethernet switch or hub.

Verifying the Connection

The LAN•GOV acts as a bridge that passes Ethernet packets freely between the LAN 1 and LAN 2 ports. The LAN•GOV connection can be verified by testing connectivity between hosts that are sitting between the LAN•GOV.

The LAN•GOV, if so configured, is also a device with IP addresses on the LAN ports with telnet and ping capability. Ping tests to or from the LAN•GOV can verify the LAN•GOV connection to the network.

The SHOW STATISTICS CLI command displays the number of packets received and transmitted on a LAN port. The statistics can be used to confirm or troubleshoot the LAN•GOV network connections.

Chapter 6

Troubleshooting

Communication and Network system are subject to problems from a variety of sources. Fortunately, an organized troubleshooting approach usually leads to the area of the problem in short order. It is essential to distinguish between problems caused by the LAN (network system) and the LAN•GOV configuration.

This troubleshooting chapter is structured with symptoms in the order the user might encounter them.

Unable to Communicate with the LAN•GOV

The LAN•GOV is delivered in a configuration to function as a bridge with a relatively high committed information rate. Therefore, it would be expected that a LAN•GOV could be placed between any two points on a network without disrupting the network. After a brief initialization period while the LAN•GOV is learning about the network it will reach for forwarding state and the network should be functional.

Proceed through the following symptoms if you are unable to communicate through the LAN•GOV between points on the network (Telnet, Ping, etc.).

Ethernet/General

Cause: Network is faulty

Solution: Verify other elements of the network are good by swapping the LAN•GOV with a single cable. The endpoints of the cable on each LAN•GOV LAN port are replaced by the endpoints of the single cable.

Cause: Network Cabling is faulty

Solution: Check the LNK LEDs on both LAN•GOV LAN ports to confirm a good connections. Check the LAN1 interface statistics to confirm the error rate. Check the status LEDs on the equipment to which the LAN•GOV LAN ports are connected. Determine if the cable is a 10/100BaseT crossover cable. A crossover cable might not work with some equipment, such as a hub.

Cause: LAN•GOV Ethernet Auto-negotiation is not configured correctly

Solution: If the device connected to the LAN•GOV LAN port is not configured or capable of auto-negotiation, then configure LAN port LAN1 interface AUTONEGOTIATION OFF. The LAN1 interface SPEED and DUPLEX mode should be set to match the configuration or capability of the device.

If the device connected to the LAN•GOV is uses auto-negotiation and the LAN•GOV is configured for DUPLEXFULL and AUTONEGOTIATION OFF, the other device may operate in half duplex mode by default. The LAN1 interface AUTONEGOTIATION should be set to ON if the other device uses auto-negotiation.

Can't Communicate with LAN•GOV - Telnet, Ping

Cause: IP address is not set properly on the LAN•GOV

Solution: The Console Port, which requires an RJ45 to DB9 adapter, provides direct access to the configuration of the LAN•GOV. Note: the RJ45 Cable that connects to the Console Port must have 8 connections pinned 1 to 1 (Typical Ethernet cables are only 4 wires). The Console port utilizes the Command Line interface, detailed in Chapter 4: Command Line Interface, and in the Appendices. Interface LAN1's IP Address must be in the subnet of the computer that is attempting to access it locally.

Cause: Workstation not on the same subnet as the LAN•GOV

Solution: During an initial configuration of a LAN•GOV, communication

should come from within the same net/subnet. With no default router, the LAN•GOV will not be able to reply to communication off its own subnet.

Cause: IP stack on the workstation not configured

Solution: Ensure that other devices on the same LAN can be pinged, or otherwise 'seen'.

Can't communicate to the LAN • GOV - Console Port

Cause: Baud Rate, Stop Bits, etc. set wrong on communication application

Solution: Ensure the communication software is configured for a fixed, asynchronous data rate of 9600 bps, 1 stop bit, no parity, 8 bit fixed and that the Flow control is set to none.

Cause: Transmit and Receive Data swapped

Solution: The console port RJ45 to DB9 adapter is configured as a DCE (data communication equipment) port. For connection to other DCE, such as a modem, a Null Modem adapter is required. Note: the RJ45 Cable that connects to the Console Port must have 8 connections pinned 1 to 1 (Typical Ethernet cables are only 4 wires).

Appendix A

LAN • GOV Specifications

Ethernet Ports

- 10/100BaseT Full Ethernet

LAN Protocol

- TCP/IP, ICMP

Rate Limiter

- 64Kbps to 43,232K rate limiting range
- Configurable in 64K, 1,544K, and 2,048K bps increments

Power Supply

- External 24 Volts AC, 1Amp, with standard AC plug. International power supplies available.

Physical

- Standard 19 inch rack mount kit available
- Dimensions: 9.0 x 7.3 x 1.63 inches
- Weight: approximately 2 lbs., excluding external power adapter.

Appendix B

LAN•GOV Switch Settings

LAN•GOV systems contain a four position DIP Switch which is accessible by removing the unit rear panel and sliding out the motherboard.

The default setting for all DIP switches is **OFF**.

Switch 1

Powering cycling the unit with DIP Switch 1 ON forces the LAN•GOV to return to factory default settings. Factory settings include operation from Base Flash and deleting any download upgrades. Ensure Switch 1 is returned to the OFF position after clearing an upgrade so future upgrades can be performed successfully.

Switch 2

On executes full diagnostics at power on. The default is off, which reduces start up time.

Switch 3

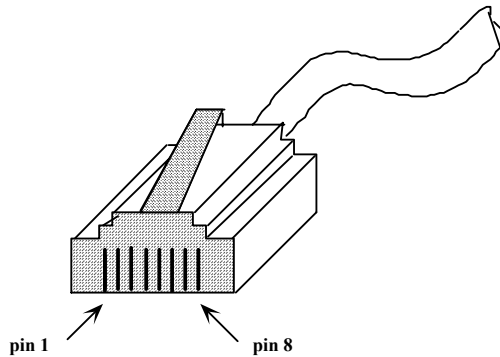
Not used.

Switch 4

Not used.

Appendix C

10/100BaseT Port Specification (w/ Crossover cable pinout)



10BaseT Plug pin numbering

Pin 1	TxD+
Pin 2	TxD-
Pin 3	RxD+
Pin 6	RxD-

For 10BaseT Crossover (allowing connection directly between two 10BaseT devices) wire:

(TD+)	Pin 1	to	Pin 3	(RD+)
(TD-)	Pin 2	to	Pin 6	(RD-)
(RD+)	Pin 3	to	Pin 1	(TD+)
(RD-)	Pin 6	to	Pin 2	(TD-)

Appendix D

Console Port Information

RJ45 Console Port Pinout

RJ45 pin	Signal Name
3	TxData
6	RxData
1	RTS
8	CTS
4	Gnd
2	DTR

RJ45/db9F Null Modem Adapter

RJ45 pin	db9pin
3	2
6	3
1	8
4	5
2	6

Glossary

Terms and Concepts

Before using the LAN•GOV, you should be familiar with the terms and concepts that describe TCP/IP. If you are experienced with internet routers, these terms may already be familiar to you.

General Networking Terms

Network

A network is a collection of computers, server devices, and communication devices connected together and capable of communication with one another through a transmission medium.

Internet

An internet is any grouping of two or more networks connected by one or more internet routers.

Addresses

Transmitting information in a network system is made possible by an addressing scheme that identifies the sender and destination of the transmission, using network and node addresses. Data is transmitted to and from these addresses in the form of packets.

Node

Device on the network

TCP/IP Networking Terms

FTP

File Transfer Protocol gives users the ability to transfer files between IP hosts. It uses TCP to provide connection initiation and reliable data transfer.

Host

A computer with one or more uses that can act as an endpoint of communication if it has TCP/IP.

ICMP

Internet Control Message Protocol provides a means for intermediate gateways and hosts to communicate. There are several types of ICMP messages and they are used for several purposes including IP flow control, routing table correction and host availability.

IP

Internet Protocol which routes the data.

PING

Packet InterNet Groper is a program which uses ICMP echo request message to check if the specifies IP address is accessible from the current host.

Port

A Destination point used by transport level protocols to distinguish among multiple destinations within a given host computer.

SubNet Address

An extension of the IP addressing scheme which enables an IP site to use a single IP address for multiple physical networks. Subnetting is applicable when a network grows beyond the number of hosts allowed for the IP address class of the site.

TCP

Transmission Control Protocol ensures reliable, sequential, delivery of data. TCP at each end of the connection ensures that the data is delivered to the application accurately, sequential, completely and free of duplicates. The application passes a stream of bytes to TCP which breaks it into pieces, adds a header, forming a segment, and then passes each segment to IP for transmission.

Telnet

The TCP/IP standard protocol for remote terminal connection service. A user can telnet from the local host to a host at a remote site.

Communication Link Definitions**Data Communication Equipment (DCE)**

This interfaces to the communication service's transmission/reception medium, and includes T1 Voice/Data Multiplexors, 64/56 Kilobit DSU/CSUs, and Fiber Optic Modems. The DCE provides the transmit and receive data pathways, along with their synchronous clocking signals, that are used by the Engage Router's DTE interface for full duplex communication between the remotely interconnected networks.

Data Terminal Equipment (DTE)

This equipment, such as an Engage Router, attaches to the terminal side of Data Communication Equipment.

Data Terminal Ready (DTR)

Prepares the DCE to be connected to the phone line, then the connection can be established by dialing. Enables the DCE to answer an incoming call on a switched line.