

**ISTITUTO NAZIONALE di FISICA NUCLEARE
LABORATORI NAZIONALI DI FRASCATI**

**LNF-91/002(NT)
15 Gennaio 1991**

M.L.Ferrer, F.Sgamma, J.Wang:

**COORDINATION BETWEEN TCP/IP PROTOCOL ON VAX AND APOLLO
DOMAIN**

LNF-91/002(NT)
15 Gennaio 1991

COORDINATION BETWEEN TCP/IP PROTOCOL ON VAX AND APOLLO DOMAIN

M.L.Ferrer, F.Sgamma, J.Wang

INFN-Laboratori Nazionali di Frascati, P.O. Box 13, 00044 Frascati, Italy

ABSTRACT

TCP/IP protocol has defined two types of routing methods: static and dynamic. In this note we give details how these routing methods could be coordinated between VAX and APOLLO Domain.

INTRODUCTION

The work here presented was carried out at the Laboratori Nazionali di Frascati, trying to solve the problem of interconnection between different CAD mechanical groups located in different INFN Sections or Laboratories.

Typically, each INFN site is configured as presented in Fig. 1. Computers from different manufacturers (VAX, IBM, APOLLO, ...) are connected through an Ethernet local area network (LAN) and run one or more high level network protocol (DECnet, TCP/IP, ...). Sometimes one or more APOLLO Domain are included. In this case some APOLLO implements the gateway function between the two different networks. (GAMMA in the LNF configuration). One VAX running the WIN/TCP software from Wollongon, and working as a TCP/IP - DECnet gateway, transports the protocol over DECnet circuits on geographical lines, allowing the TCP/IP interconnection with all the HEPnet network (see Fig. 2).

1 - THE DIFFERENCE BETWEEN ROUTING PROTOCOLS OF WIN/TCP AND DOMAIN TCP/IP

The main problem encountered in running the TCP/IP protocol on VAX and Apollo Domain is the coordination of different routing protocols.

On both WIN/TCP and Domain TCP/IP the "routing table", which is the internal database of routes from local gateway to the destinations, are needed for routing. But the protocols for setting and maintaining the table are different.

In default configuration, Domain TCP/IP uses RIP protocol (Routing Information Protocol) for routing. The routing table will be dynamically maintained. The remote gateways must be specified indicating the type of routing implementation: GW/PRIME or GW/DUMB for using RIP protocol or not.

The 'rip_server' broadcasts its routing tables every 30 seconds. If the remote gateway is specified as 'GW/PRIME' in the file /sys/tcp/hostmap/local.txt, its entry will be added to the internal routing table of the local gateway only when the 'rip_server' receives the signal broadcasted by it. The 'rip_server' will delete its entry if it is not refreshed by broadcasts.

On the other hand, up to now most of the WIN/TCP working on VAX have not followed the RIP protocol. The static routing method is used. All entries in the routing table must be established or deleted only by the command:

ROUTE ADD/DELETE destination gateway 0/1

So it will be very important to have a correct configuration when working on both WIN/TCP and Domain TCP. In the following we will specify the coordinating methods and give an example used in the LNF.

2 - THE CONFIGURATION FOR COORDINATING WIN/TCP AND DOMAIN TCP/IP

There are two ways to coordinate the WIN/TCP and Domain TCP/IP, using respectively static or dynamic routing method.

1) Keeping the current configuration of WIN/TCP.

On Apollo gateway we must:

- * Specify the remote gateways, which uses WIN/TCP without RIP protocol, with the type GW/DUMB in file /sys/tcp/hostmap/local.txt.
- * Start the servers of TCP/IP: 'tcp_server', 'rip_server', 'telnet_server', 'ftp_server'.
- * Set up the static entry for these remote gateway by the command:

SETRROUTE ADD destination gateway [metric]

in the case of Operating System 9.7.5 or

ROUTE ADD destination gateway [matrix]

in the case of Operating System 10.2.

2).Start the RIP protocol implementation on WIN/TCP.

In this way, we need to follow these steps:

* On APOLLO:

- a) Specify the gateway, which uses WIN/TCP with RIP protocol, as the type GW/PRIME.
- b) Start the servers.

* On VAX, start the RIP protocol. This requires the following steps:

- a) Edit the configuration file for RIP protocol:

TWG\$TCP:[NETDIST.ETC]GATED.CONF

(see the example in next paragraph).

- b) Start the RIP protocol using the following command:

@TWG\$TCP:[NETDIST.MISC]GATED

3 - THE EXAMPLE

The above two configurations have been tested for coordinating the WIN/TCP and Domain TCP in LNF of Frascati.

The topology and configuration of TCP/IP network in LNF of Frascati is as shown in Fig. 1. The goal is to communicate among the Apollo machines, which are located in different Apollo Domains and are connected with each other through DECnet, as shown in Fig. 2.

Procedure 1: Keeping the current configuration of WIN/TCP on VAX without RIP protocol.

* Edit //gamma/sys/tcp/hostmap/local.txt to include the following definitions:

```

.....
NET : 131.154.19.0      : ETH0 :
NET : 131.154.119.0   : DR0  :
;
GATEWAY : 131.154.119.1,      131.154.19.3   : GAMMA  :CPUTYPE : OPSYS : IP/GW, GW/PRIME :
GATEWAY : 131.154.254.19,    131.154.19.1   : VAXLNF :CPUTYPE : OPSYS : IP/GW, GW/DUMB :
;
HOST : 131.154.119.1,      131.154.19.3   : GAMMA  :
HOST : 131.154.19.1,      131.154.254.19 : VAXLNF,GWLNF :
HOST : 131.154.5.1,       131.154.254.5   : VAXROM,GWROMA :
```

```

HOST : 131.154.20.1,      131.154.254.20      : MVXNA1 :
HOST : 131.154.20.101,  131.154.120.1      : GWAPONA,APONA1 :
;
HOST : 131.154.119.7   : CHI   :
HOST : 131.154.120.2   : APONA2 :
HOST : 131.154.5.40    : CADRM  :

```

.....

- * Stop TCP/IP.
- * Execute the command:

```
/sys/tcp/hostmap/makehost.sh
```

in order to create the new internal database.

- * Modify the system startup file:

```
//gamma/sys/node_date/startup.191
```

adding the following commands to start the servers and execute the command 'setroute':

```

cps -w /sys/tcp/tcp_server
cps -w /sys/tcp/rip_server
cps -w /sys/tcp/telnet_server
cps -w /sys/tcp/ftp_server
# wait for the completion of starting all TCP/IP servers, because only
# after tcp_server is activated the "setroute" command can work
cps /com/sh -c '/systest/pause 100'
cps /com/sh -c '/sys/tcp/setroute add default 131.154.19.1 1'

```

- * Shutdown and restart the node.

Procedure 2: Start the process GATED, which implements the RIP protocol on WIN/TCP.

- * On Apollo GAMMA:

a) Edit the file

```
/sys/tcp/hostmap/local.txt
```

to specify the VAXLNF as a gateway using RIP protocol:

.....

```

NET : 131.154.19.0      : ETH0 :
NET : 131.154.119.0    : DR0  :
;
GATEWAY : 131.154.119.1,  131.154.19.3   : GAMMA :CPUTYPE : OPSYS : IP/GW, GW/PRIME :
; Specify the VAXLNF as a dynamic routing gateway
GATEWAY : 131.154.254.19,  131.154.19.1   : VAXLNF :CPUTYPE : OPSYS : IP/GW, GW/PRIME :
;
HOST : 131.154.119.1,    131.154.19.3     : GAMMA :
HOST : 131.154.19.1,    131.154.254.19  : VAXLNF,GWLNF :
HOST : 131.154.5.1,     131.154.254.5    : VAXROM,GWROMA :
HOST : 131.154.20.1,    131.154.254.20   : MVXNA1 :

```

HOST : 131.154.20.101, 131.154.120.1 : GWAPONA,APONAI :
 ;
 HOST : 131.154.119.7 : CHI :
 HOST : 131.154.120.2 : APONA2 :
 HOST : 131.154.5.40 : CADRM :

.....

- b) Stop the TCP/IP.
- c) Execute the command:

/sys/tcp/hostmap/makehost.sh

- d) Modify the system startup file:

//gamma/sys/node_date/startup.19l

adding the following commands to start the servers:

```
cps -w /sys/tcp/tcp_server
cps -w /sys/tcp/rip_server
cps -w /sys/tcp/telnet_server
cps -w /sys/tcp/ftp_server
```

- e) Shutdown and restart.

* On VAXLNF:

- a) edit the file:

TWG\$TCP:[NETDIST.ETC]GATED.CONF

as following:

```
# GATED.CONF
# specify VAXLNF is a RIP sender and receiver
RIP gateway 1
EGP no
HELLO no
#
# trusted hosts running RIP - GAMMA
trustedripgateways 131.154.19.3
#
# Don't time out interfaces of VAXLNF!
#
passiveinterfaces 131.154.19.1
#
# tell the world that I am default route
announce 0 intf all proto rip
```

- b) Start the RIP protocol executing:

\$ @ TWG\$TCP:[NETDIST.MISC]GATED

After procedure 1 or procedure 2, on GAMMA we have examined the routing table using the command:

```
$ TCPSTAT -G
```

The output obtained is:

Local_net	→	Foreign_net	via local_addr	Flag
			VAXLNF	UG
			VAXLNF	UG or USG

Here the first item VAXLNF is established by `/sys/tcp/makegate` when 'tcp_server' has been started. It specifies that the gateway GAMMA is connected to the gateway VAXLNF. The second item VAXLNF indicates that VAXLNF is the default gateway.

When the first procedure is used, this item has been established by the command:

```
/sys/tcp/setroute add default 131.154.19.1 1
```

and the 'Flag' is USG, which means the VAXLNF is a static gateway for GAMMA.

When the second procedure is used, it has been established by the 'rip_server' after has received the first broadcast from VAXLNF. Its 'Flag' is UG, which means that it is a dynamic gateway for GAMMA. So it would be deleted, if no broadcast comes from VAXLNF later.

With above configuration, the following communications have been tried with satisfied results.

GAMMA	<===>	VAXROM	CHI	<===>	VAXROM
GAMMA	<===>	CADRM	CHI	<===>	CADRM
GAMMA	<===>	APONA2	CHI	<===>	APONA2

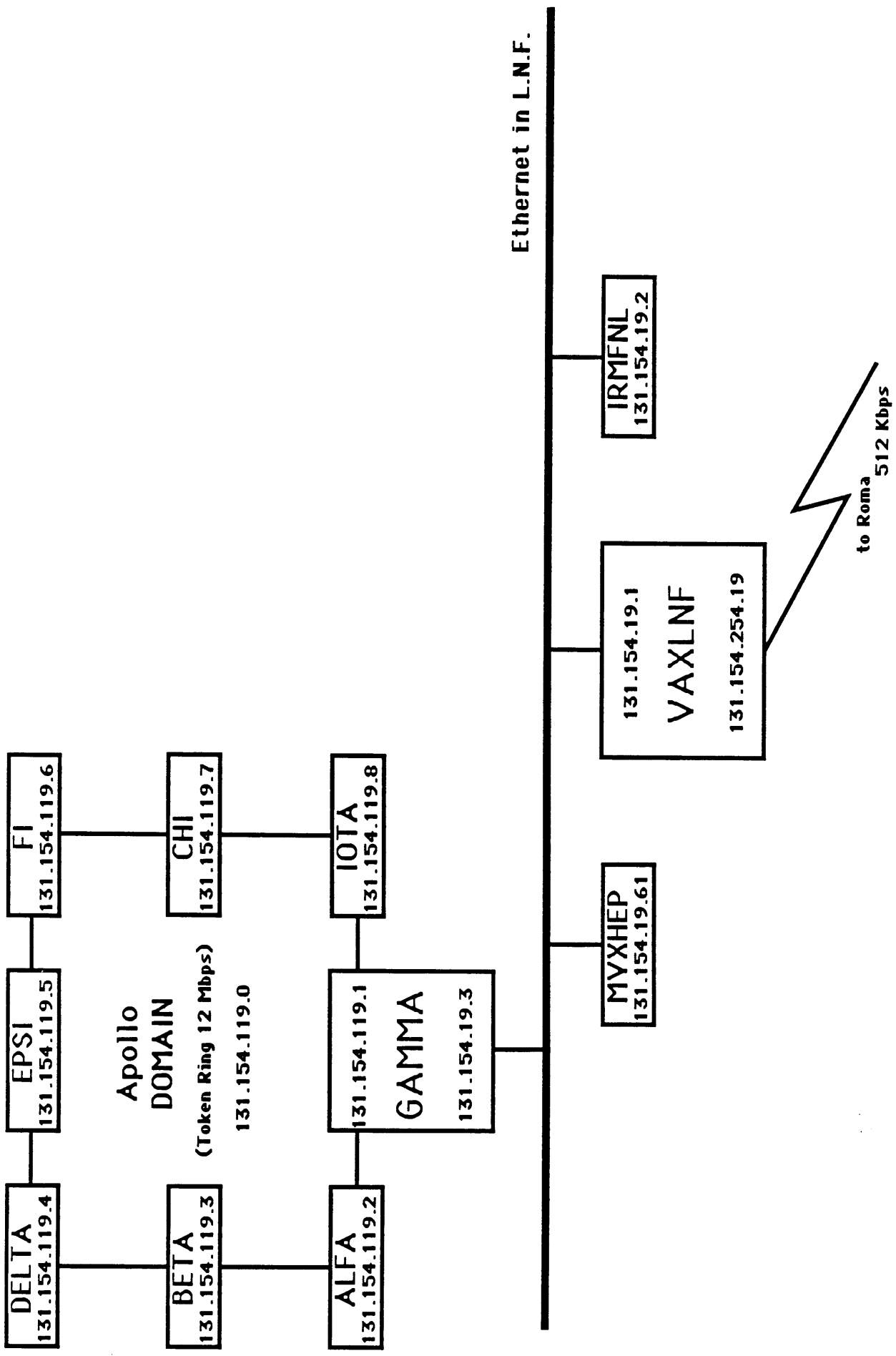


FIG. 1 - The configuration of TCP/IP network in LNF.

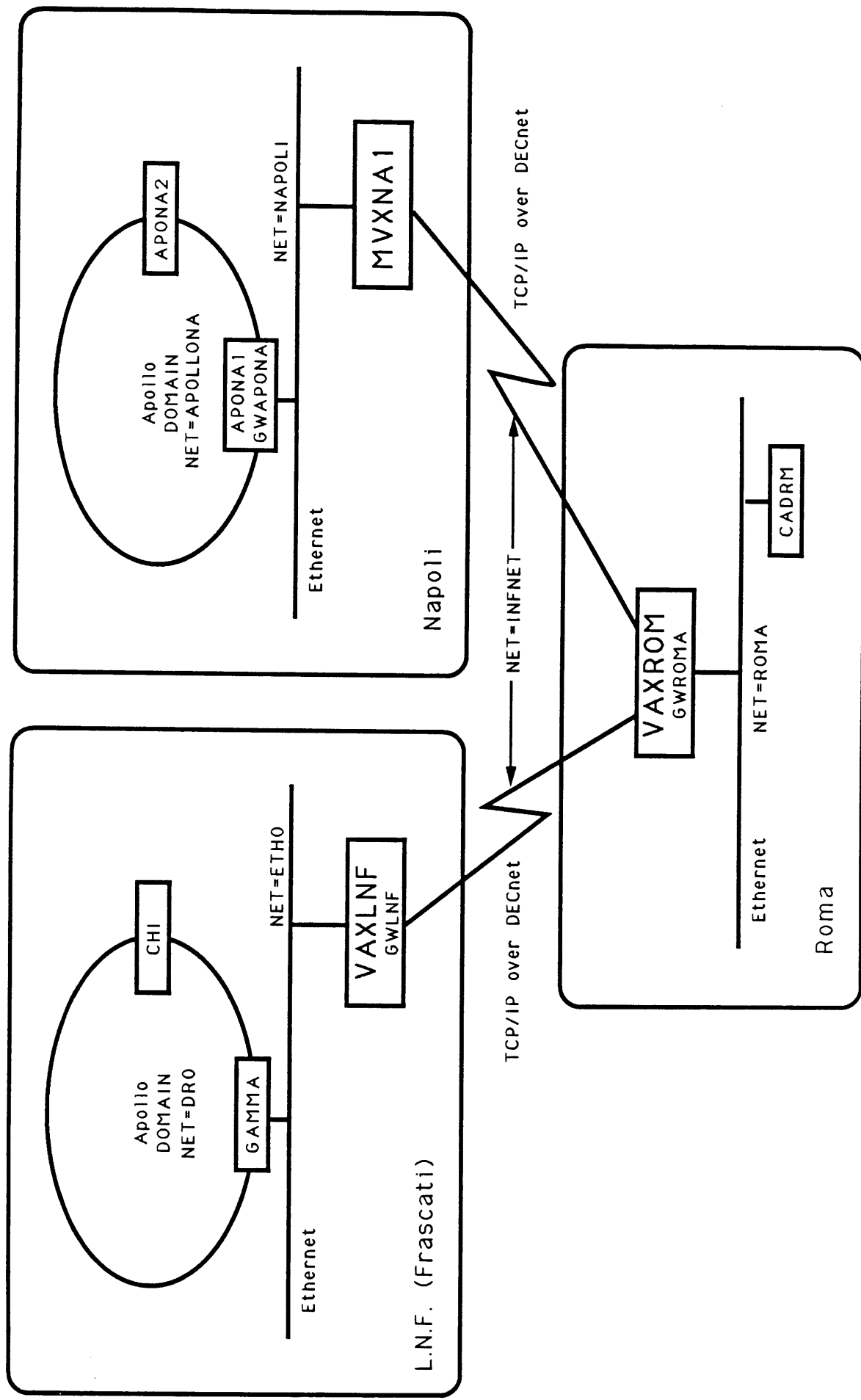


FIG. 2 - An example of geographic TCP/IP configuration.

