Consiglio Nazionale delle Ricerche

ISTITUTO DI ELABORAZIONE DELLA INFORMAZIONE

PISA

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LA RETE LOCALE DELL'ISTITUTO DI ELABORAZIONE DELL'INFORMAZIONE

CONFIGURAZIONE ATTUALE, NOTE DI UTILIZZO E PROSPETTIVE

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La rete locale dell'Istituto di Elaborazione dell'Informazione
Configurazione attuale, note di utilizzo e prospettive

C. Montani

1. Introduzione

In seguito alla installazione delle ultime apparecchiature (avvenuta nello scorso mese di Aprile) si puo' affermare che la rete locale di Istituto, almeno da un punto di vista hardware, e' stata completata.

Da un punto di vista software e' auspicata una evoluzione per quanto riguarda i servizi piu' generali di rete quali la posta, la bacheca, etc. Di questo aspetto parleremo nella sezione "Evoluzioni".

La presente nota ha lo scopo di illustrare la configurazione attuale della rete e fornire indicazioni di base per poterne sfruttare al meglio le potenzialita'.

2. Generalita'

La rete locale dell'Istituto di Elaborazione dell'Informazione e' di tipo *Ethernet* (specifiche IEEE 802.3). Il protocollo di comunicazione adottato e' il *TCP/IP* (Transmission Control Protocol / Internet Protocol).

La figura 1 schematizza la configurazione attuale della rete; da un punto di vista fisico essa e' costituita da 3

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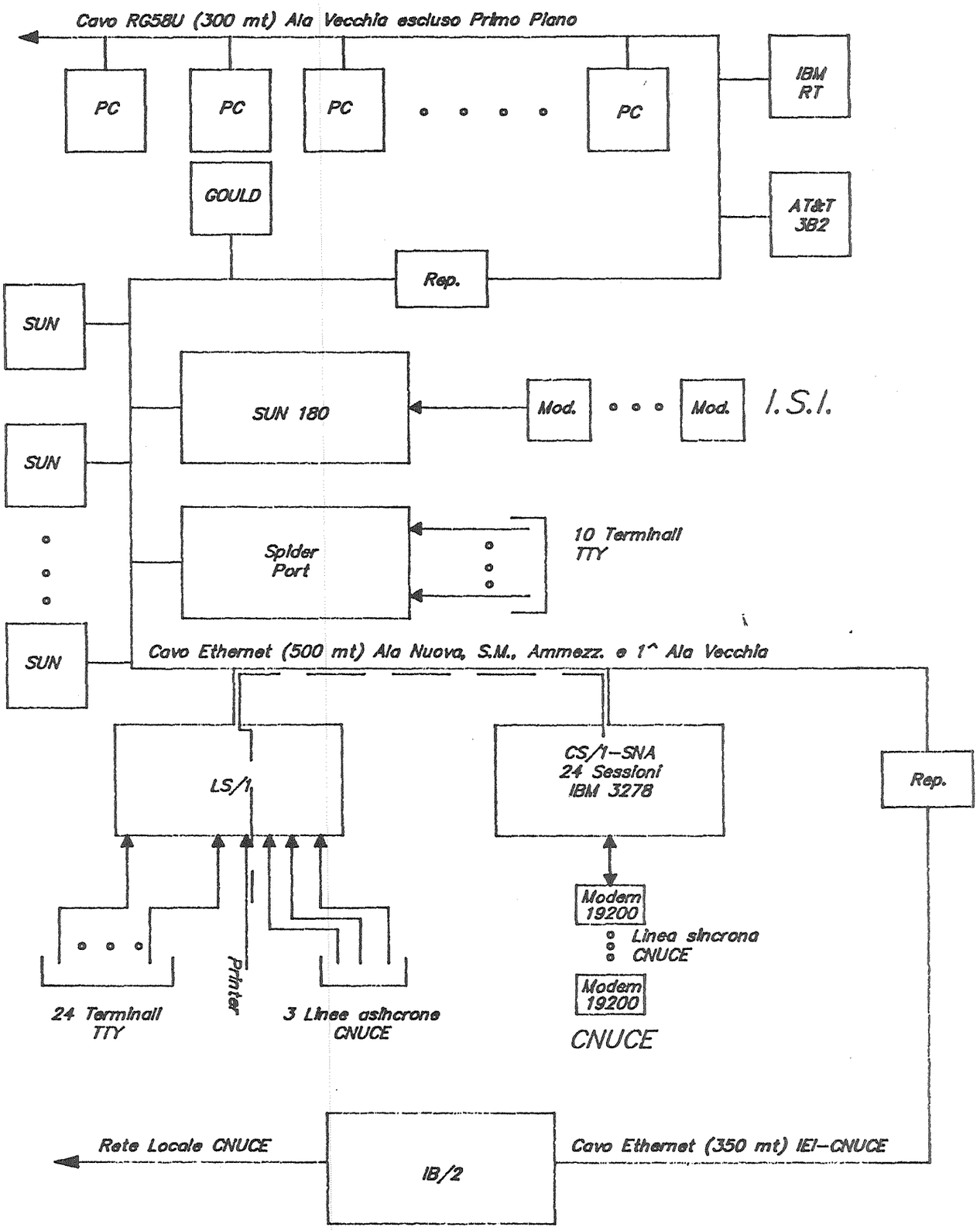
Configurazione Rete Locale



tronconi collegati da 2 Ethernet Repeater. Lo spezzone che serve il Piano Attico ed il Primo e Secondo Piano dell'Ala Vecchia e' del tipo Thin Ethernet (RG58U) mentre i tronconi restanti sono di tipo Thick Ethernet. Questa precisazione, apparentemente insignificante, deve essere tenuta presente da chi intende collegare una propria workstation: per il collegamento sul cavo thick e' necessario disporre di transceiver (a spillo) e relativo cavo; per il cavo thin e' invece necessario un transceiver on board dotato di uscita BNC.

La rete locale IEI e' fisicamente collegata alla rete locale Ethernet dell'Istituto CNUCE mediante il separatore di traffico Bridge IB/2. Questo consente l'accesso ai server in rete del CNUCE ed alle reti geografiche cui il CNUCE accede.

3. I Server di Rete

La nostra rete locale non dispone attualmente di un server di rete vero e proprio (la scatoletta Gould nello schema, che potrebbe assolvere il compito, e', per il momento, soltanto propositiva) quanto piuttosto di server specializzati. Vediamo la loro funzione:

a) *Spider Port*: concentratore di terminali asincroni; supporta fino a 10 terminali consentendo il login remoto verso le workstation o mainframe in rete;

b) *Bridge LS/1*: concentratore di terminali asincroni; dispone di 32 porte seriali RS232 per il collegamento di terminali, personal computer e stampanti. Nella configurazione attuale 28 porte sono destinate a terminali, una porta e' collegata ad una stampante Mannesman Tally MT180 con ingresso seriale utilizzata come printer remoto del sistema VTAM del CNUCE e le restanti porte sono connesse a linee asincrone (4800 baud) del sistema VTAM del CNUCE. Queste ultime 3 linee host consentono il collegamento asincrono in line mode con il sistema VTAM da parte dei terminali fisicamente collegati all'LS/1.

c) *Bridge CS/1-SNA*: Server di interconnessione di terminali o personal computer con il sistema IBM (ambiente SNA) del CNUCE. Collegato mediante linea sincrona a 19.200 baud all'ambiente SNA il server si comporta, lato IBM, come una Control Unit SNA 3274 e presenta, lato rete, fino a 24 sessioni contemporanee di terminale IBM 3278-3279. Nella nostra configurazione le sessioni 3278-3279 sono 23 ed una porta virtuale e' riservata al collegamento con la stampante remota del server LS/1.

Attualmente il server CS/1-SNA svolge anche la funzione di Name Server: detiene, cioe', una tabella di corrispondenza tra gli indirizzi Internet ed i nomi simbolici delle workstation in rete.

4. Norme per gli utenti di Terminali TTY o assimilati

Gli utenti di terminali asincroni, personal computer non IBM o personal computer IBM non dotati di scheda Etherlink o Ilana possono chiedere il collegamento al server LS/1 (il cavetto quadripolare che da ogni stanza arriva in Sala Macchine serve egregiamente allo scopo). Questo collegamento permette il login remoto ai vari sistemi collegati in rete. L'appendice A elenca i comandi di LS/1 disponibili; mi preme sottolineare in particolare che ogni terminale puo' disporre di piu' sessioni attive contemporanee (collegamento a piu' host o a piu' macchine virtuali contemporaneamente). Il limite attuale e fissato in 2 sessioni contemporanee ma piu' essere ampliato dal manager di rete sulla base di comprovate esigenze.

Praticamente, richiesta una prima connessione con il comando:

LS/1>*c nome_simbolico_host*

oppure:

LS/1>*c indirizzo_internet_host*

si ritorna in locale (premendo contemporaneamente *CTRL* ^) e si rilancia il comando Connect. Lo switch tra una sessione e l'altra e' ottenuto rientrando in locale (il server fornisce

il prompt LS/1>) e lanciando il comando *RESume numero_di_sessione* indicando quale sessione si intende riesumare.

L'appendice E fornisce un elenco dei nomi simbolici e relativi indirizzi Internet dei server attualmente raggiungibili. La connessione, ad esempio, con la Workstation SUN di nome lilly puo' essere effettuata con il comando:

LS/1>*c lilly*

oppure:

LS/1>*c 192.12.192.160*

Gli utenti che necessitano di collegarsi ai sistemi dell'Istituto CNUCE hanno tre diverse possibilita':

a) con il comando:

c vm (oppure *c 192.12.192.2*)

si ottiene il collegamento con il server DACU del CNUCE (in pratica l'interfaccia TCP/IP del sistema IBM VM).

b) con il comando:

c cnucefs (oppure *c 192.12.192.133*)

si ottiene il collegamento con una delle 23 porte virtuali del server CS/1-SNA. Il server presenta una lista di terminali emulati:

0. IBM 3101 10. VT 100Kp

1. TV 925	11. VT 220Kp
2. VT 100	12. VIP 7305
3. Beehive	13. VIP 7201
4. ADM 1178	14. VT 240
5. FALCO 1078	15. MT 200Kp
6. XEROX 820	16. IBM 3278
7. VIP 7814	17. VT 220
8. ADM 3A	18. TANDEM 653X
9. VIP 7801	

tra i quali scegliere sulla base del proprio terminale. Da questo punto il CS/1-SNA fornisce una emulazione di terminale IBM 3278-3279. La corrispondenza tra la tastiera del terminale e la tastiera IBM 3278 puo' essere ritrovata sulle tabelle dell'appendice B.

c) con il comando:

c cnucell (oppure *c 192.12.192.131*)

si ottiene il collegamento con una delle tre linee host asincrone del server LS/1. Le linee sono dotate di protocollo XON/XOFF e possono quindi essere connesse anche da un terminale con velocita' inferiore ai 4800 baud (velocita' delle linee host).

Gli inconvenienti riscontrati sino ad ora con i 3 metodi di collegamento appena descritti sono, rispettivamente:

a) l'invio di stampe eccessive al terminale puo' "impiccare" la macchina virtuale. Se uno o piu' break non dovessero sortire alcun effetto e' necessario chiedere all'operatore di forzare il logoff per la macchina virtuale;

b) se il terminale di cui si dispone (o personal computer) non si comporta fedelmente come uno dei terminali emulati

puo' non esistere corrispondenza perfetta tra le chiavi locali e quelle della tabella di corrispondenza. Quando la mascherina del VM non compare sullo schermo (dopo la scelta del terminale emulato) e' consigliabile telefonare al 593262 e chiedere se lo SNA e' funzionante oppure, in subordine, se la linea 57068 e' attiva;

c) le tre linee host sono collegate, al CNUCE, ad un line switch asincrono che, ufficialmente, non e' in servizio. Le proteste per eventuali (neppure tanto) disservizi vanno inoltrate a Lemmetti del CNUCE. Stante la non ufficialita' del servizio le proteste devono essere estremamente educate.

5. Norme per gli utenti di Personal Computer dotati di scheda Etherlink o Ilana

Gli utenti di Personal Computer IBM (o compatibili) dotati di scheda Etherlink (o Ilana) possono scegliere tra diversi pacchetti per il login remoto, il file transfer, etc.

Dopo numerose, seppur non esaustive, prove mi permetto di suggerire la sostituzione del pacchetto attualmente in uso (Etherterm di Bridge) con l'analogo "TCP/IP for the PC" di IBM. I vantaggi derivanti dall'uso di questo pacchetto sono notevoli:

a) il PC emula un terminale IBM 3278 se l'host invocato con Telnet e' un host IBM, altrimenti il Personal emula un terminale Heath H19 (in entrambi i casi esistono tabelle di corrispondenza, riportate in Appendice C, tra PC e terminali emulati);

b) il file transfer puo' essere attivato in ambiente Telnet (in questo caso il trasferimento e' controllato dal Trivial File Transfer Program dell'host);

c) esiste un ambiente completo di Mail (versione IBM del Rand Corporation's Message Handling System);

d) il file transfer puo' essere effettuato anche tra Personal Computer;

e) dispone di molti comandi di utilita' quali Cookie, Ping, Nicname, Host, etc.

Il pacchetto viene distribuito dal manager di rete previa presentazione di 2 dischetti HD oppure 7 dischetti DD. Le fotocopie del manuale sono a carico dei singoli utenti.

Per gli utenti che necessitano di file transfer da e verso minidisco della una macchina virtuale VM mi permetto di suggerire alcuni requisiti di base per trasferire file con un certo successo.

Ogni minidisco puo' essere dotato di password di lettura (il disco e' acceduto in sola lettura), password di scrittura (il disco e' acceduto in scrittura se possibile, altrimenti

non viene acceduto affatto), password multipla (il disco e' acceduto in scrittura, se possibile, altrimenti in sola lettura). Coloro che non rammentano le password dei propri minidischi possono definirne di nuove con il comando:

rpas
dir def wpas xxx
mpas

dove xxx indica il minidisco cui le password vanno associate (191, 19E, etc.).

In ambiente FTP si puo' accedere al minidisco desiderato mediante il comando:

ftp> *cd nome_macchina_virtuale.191*

e fornire la password (di lettura, scrittura o accesso multiplo) a richiesta del programma. Nel caso di utilizzo di pacchetti diversi da quello suggerito la password in questione puo' essere fornita mediante la sequenza:

ftp> *quote acct password*

Acceduto il minidisco si puo' effettuare il trasferimento avendo l'accortezza di indicare i files CMS come nome.tipo (il modo e' implicito visto che si puo' accedere ad un solo minidisco per volta).

Il file transfer effettuato in questo modo puo' avvenire soltanto da e verso i minidischi presenti nella definizione della macchina virtuale (tipicamente il minidisco di indirizzo 191). Esiste la possibilita' di trasferire file da

e verso i dischi di mass storage. Stabilita la connessione con l'host IBM si lancia il comando CMS:

accprod arpa

che rende disponibili i servizi di rete del sistema VM e si entra nell'ambiente di Trivial File Transfer mediante il comando:

tftp

In questo ambiente e' possibile aprire una connessione con il personal su cui state lavorando (*open 192.12.192.xxx* oppure *open nome_del_personal*) ed effettuare il file transfer (comandi *get* e *put*) da e verso un minidisco qualsiasi. Alcune osservazioni:

a) i servizi di rete sotto VM (telnet, ftp, tftp, etc.) richiedono la preventiva esecuzione del comando di CP:

set ecmode on

b) nello specificare i nomi dei file per i comandi *get* e *put* si tenga presente che l'ambiente locale e' ora la macchina virtuale mentre l'host e' il personal su cui lavorate.

Come riportato in Appendice E l'indirizzo Internet da utilizzare e' il 192.12.192.2 (cui e' associato il nome simbolico *vm*).

6. Norme per gli utenti di Workstation Unix

Gli utenti di workstation Unix sono generalmente espertissimi in tutto cio' che riguarda le reti locali e geografiche.

Mi permetto soltanto di suggerire alcuni requisiti di base per trasferire file da e verso una macchina virtuale VM con un certo successo.

Ogni minidisco puo' essere dotato di password di lettura (il disco e' acceduto in sola lettura), password di scrittura (il disco e' acceduto in scrittura se possibile, altrimenti non viene acceduto affatto), password multipla (il disco e' acceduto in scrittura, se possibile, altrimenti in sola lettura). Coloro che non rammentano le password dei propri minidischi possono definirne di nuove con il comando:

rpas
dir def wpas xxx
mpas

dove xxx indica il minidisco cui le password vanno associate (191, 19E, etc.).

In ambiente FTP si puo' accedere al minidisco desiderato mediante il comando:

ftp> *cd nome_macchina_virtuale.191*

e fornire la password (di lettura, scrittura o accesso

multiplo) mediante la sequenza:

ftp> *quote acct password*

Acceduto il minidisco si puo' effettuare il trasferimento avendo l'accortezza di indicare i files CMS come nome.tipo (il modo e' implicito visto che si puo' accedere ad un solo minidisco per volta).

Il file transfer effettuato in questo modo puo' avvenire soltanto da e verso i minidischi presenti nella definizione della macchina virtuale (tipicamente il minidisco di indirizzo 191). Esiste la possibilita' di trasferire file da e verso i dischi di mass storage. Stabilita la connessione con l'host IBM si lancia il comando CMS:

accprod arpa

che rende disponibili i servizi di rete del sistema VM e si entra nell'ambiente di Trivial File Transfer mediante il comando:

tftp

In questo ambiente e' possibile aprire una connessione con la workstation su cui state lavorando (*open 192.12.192.xxx* oppure *open nome_workstation*) ed effettuare il file transfer (comandi *get* e *put*) da e verso un minidisco qualsiasi. Alcune osservazioni:

a) i servizi di rete sotto VM (telnet, ftp, tftp, etc.)

richiedono la preventiva esecuzione del comando di CP:

set ecmode on

b) nello specificare i nomi dei file per i comandi *get* e *put* si tenga presente che l'ambiente locale e' ora la macchina virtuale mentre l'host e' la workstation su cui lavorate.

Come riportato in Appendice E l'indirizzo Internet da utilizzare e' il 192.12.192.2 (cui e' associato il nome simbolico *vm*).

7. Utilizzo della stampante remota

La stampante remota MT180 (situata nella sala terminali del Terzo Piano Ala Vecchia) puo' essere utilizzata da chiunque necessiti di una stampa di ritorno dal CNUCE. La procedura di attivazione e' un po' laboriosa ma non insormontabile:

a) Prima attivazione della giornata: accendere la stampante; costringere A. Carobbi, G. Fiorio o C. Montani a lanciare dalla propria macchina virtuale il comando:

sm operator cmd sm rscsnet start prtiei

costringere un collega che disponga di terminale collegato al server LS/1 a lanciare il comando:

LS/1>*do snaprt*

b) Stampe: dalla proprie macchina virtuale si lanciano i comandi:

sp e rscsnet
tag dev e prtiei

print nome_del_file

c) Per evitare di dover ripetere parte della procedura di attivazione precedente e' opportuno staccare la carta dalla stampante senza metterla off_line.

8. Evoluzioni

La Commissione Rete Locale sta valutando le necessarie evoluzioni della nostra rete in termini di possibilita' di collegamento diretto in rete per le workstation che attualmente si affacciano sulla rete soltanto in emulazione di terminali TTY, acquisizione di un vero e proprio server di rete, installazione di procedure e servizi software.

Il primo punto riguarda la possibilita' di dotare i numerosi MacIntosh presenti in istituto di schede opportune che rendano tali macchine nodi attivi della rete. Il secondo e terzo punto, strettamente collegati, troveranno probabile soluzione installando su un Gould di sala macchine pacchetti per la posta interna, il trasferimento di file da e verso le segreterie, la bacheca degli avvisi, etc.

Per questo secondo aspetto sono in corso contatti con le societa' produttrici di tale software.

9. Ringraziamenti

Mi sembra questa la sede opportuna per ringraziare tutte le persone che hanno contribuito (ed ancora vi dedicano tempo) alla realizzazione della nostra rete locale. In particolare ringrazio i componenti della commissione "Rete Locale" nonche' Carlo Carlesi, Enrico Fantini, Aldo Moretto, Romano Panicucci, Piero Pardella e Paolo Stiavetti.

Appendice A. Guida Utente del server LS/1

3.2.2 Connect Command

Syntax: Connect <address>[,<address>] [ECM] [Q]
Connect (<address>) <address>[,<address>]

Default Privilege Level: User

Description: The Connect command requests a connection to the specified address. On an XNS server, the address can take the form of an Ethernet address, or a clearinghouse name. On a TCP server, the address can take the form of a TCP/IP internet address, or an internet name. The address or name can represent either a single port, a local rotary, or a global rotary. A global rotary can be specified as a list of up to eight names or addresses, or as a single name to which an address list has previously been assigned.

In the network manager form of the command, the connection is requested from the address or name enclosed in parentheses to the subsequent address. The address or name enclosed in parentheses must be a simple address, or a name that represents a simple address. The rules governing how to specify Ethernet and internet addresses are described in Section 3.1.6 and 3.1.8, respectively.

Connections cannot be made from a device attached to an XNS server to a TCP device, or vice versa.

When a connection is requested from an XNS server, the system first compares the AccessWord of the requesting port with the AccessGroup of the destination port (refer to Section 4.1.1 for asynchronous ports and 4.2.1 for virtual ports on the GS/1). If at least one common group number appears in both sets, the connection is established. If no common group number appears, the system prompts the requestor for a password associated with the AccessGroup parameter of the destination port. If the AccessGroup has more than one value, the password for any one of the values is accepted. Access control does not apply to TCP servers.

In the first form of the command, the destination port must be in Listening mode before the connection can be established. Once the connection is initiated, both ports are placed in Data Transfer mode. If the optional parameter ecm is appended, however, the local port is left in Command mode rather than Data Transfer mode. The ecm parameter is not permitted in the network manager form of the command.

In the second form (the network manager form) of the command, both of the ports being connected must be in Listening mode. When the network manager uses this command to form a connection, neither of the connected ports can use the ECMChar to change from Data Transfer mode to Command mode. Therefore, the connection can be broken only remotely by the

network manager or locally by the expiration of the AUto-disconnect interval on the destination port. Call queueing and the "ecm" parameter are not available in the network manager form of the command.

Devices being connected remotely by the network manager through a GS/1 can be on different networks. However, if one device is on an Ethernet network and the other device is on an X.25 network, the first address specified in the Connect command (the address in parentheses) must represent the device attached to the Ethernet network; the second address specified must represent the device on the X.25 network. Rotary numbers and X.25 addresses cannot be used in the address in parentheses.

For XNS servers only, the optional parameter "q" is the call queueing designation. If this parameter is included, and if the destination port is not in Listening mode when the connection request is issued, then the requesting port is put in a queue for eventual connection. The queued connection constitutes a session for the requesting port. When the destination port becomes available, the system sends the requesting port a terminal bell signal and a message that the destination device is available. The user then has 5 minutes in which to claim the connection by issuing the RESume command. If the port is in Data Transfer mode and communicating with a third port when the message is received, then the user must first return to Command mode and then either switch to the queued session or specify the queued session number when issuing the RESume command. Refer to Section 2.3.11 for an overview of the call queueing feature. Call queueing does not apply to TCP servers.

For XNS servers, if the Connect command specifies a clearinghouse name as the destination address, but does not include domain and organization fields, the local server automatically appends the default strings.

Port number 136 on any Bridge XNS server supporting the Connection Service is reserved for network management access from non-Bridge devices that are attached directly to the Ethernet (e.g., personal computers running EtherTerm software). Port 136 supports only one such connection at a time.

3.2.5 DisConnect Command

Syntax: DisConnect [<session number>]
DisConnect (<address>)

Default Privilege Level: User

Description: The first form of the DisConnect command requests that the specified session be disconnected. If no session number is specified, the current session is disconnected.

The network manager form of the command disconnects all of the specified port's sessions and places the port in Listening mode.

Example 1:

disconnect

This example terminates the current session.

Example 2:

dc 3

This example terminates session 3.

Example 3:

dc (!14)

This example terminates all sessions on port 14 of the local server and places that port in Listening mode.

Example 4:

dc (!18)

On a GS/1, this example terminates the current session on virtual port 18 of the server.

Normal Responses:

"Disconnecting ... Session <n> disconnected from <address>"

Error Messages:

"Invalid DisConnect syntax"
"Invalid network manager syntax"
"Invalid session number"
"No current session"

3.2.6 DO Command

Syntax: DO <macro name>

Default Privilege Level: User

Description: The DO command executes the specified macro. The macro name can be entered in either upper or lower case.

The break key can be used to interrupt the execution of a macro.

Refer to the description of the DEFine command for the procedure for creating a macro.

Example:

```
do TEK
```

This example executes the command file named "TEK".

Normal Responses:

Ordinarily, each command in the macro file, and the system responses to it, appear on the screen as the command is executed. This echo to the terminal is inhibited if the port's InterAction parameter is set to NoMacroEcho (refer to Section 4.1.1 for asynchronous ports and to Section 4.2.1 for virtual ports on the GS/1).

Other normal responses vary depending on the contents of the macro.

Error Messages:

"Can't DEFine from a macro"
"Insufficient privilege"
"Invalid <command name> syntax"
"Macro does not exist"
"Macros nested too deeply"
"File not found or in use"

Other error messages can be produced if a command contained in the macro fails. Refer to the section that describes the particular command.

3.2.7 Echo Command

Syntax: Echo <string>

Default Privilege Level: User

Description: The Echo command echoes the specified string on the terminal. The string must be specified according to the syntax described in Section 3.1.5. The maximum permissible length of the string is 82 characters; if more are specified, the string is truncated to 82 characters and only the truncated string is echoed.

The most common use of the Echo command is within a macro. The string is sent to the terminal executing the macro even if normal echoing is turned off by setting the InterAction parameter to NoEcho or to NoMacroEcho.

Example:

```
(
set interaction = nomacroecho
set privilege = gnm
<password>
echo "Sessions on the letter-quality printer:"
show (lq_prtr) sessions
set privilege = user
)
```

This example shows the contents of a macro that includes an Echo command. The macro is executed by a port with User privilege to determine the availability of a printer. The macro first turns off echo during macro execution in order to prevent the password from echoing on the terminal when the port's privilege level is set to Global Network Manager. The string enclosed in quotation marks echoes on the terminal, then the output of the SHow command. Finally, the port's privilege level is reset to User.

Normal Responses:

The specified string is displayed on the terminal, followed by a new prompt. If the command is executed within a macro, the new prompt appears after any output from commands within the macro, when macro execution is complete.

Error Messages:

"Invalid Echo syntax"

3.2.8 Listen Command

Syntax: Listen
Listen (<address>)

Default Privilege Level: User

Description: If a port is in Command or Data Transfer mode, the Listen command disconnects all sessions on the port and puts the port in Listening mode. While a port is in Command mode, no connection can be established to that port from a remote device until either the Listen command is given or the Autolisten interval elapses.

If a port is in a reserved state waiting for a passive connection from a queued port, a Listen command directed at the reserved port removes the requesting port from the queue and frees the destination port for connection with the next port in the queue, if any. A second Listen command within a minute clears all remaining ports from the connection queue and puts the port in Listening mode. Refer to Section 2.3.4 for a description of the modes of operation, and to Section 2.3.11 for a description of call queueing. Call queueing does not apply to servers running the TCP/IP protocols.

Example 1:

listen

This example breaks any existing connections and puts the local port in Listening mode so that connections can be made to it.

Example 2:

l (!3)

This example terminates all existing sessions and puts port 3 on the local server in Listening mode.

Normal Responses:

If a terminal is attached to the affected port, the Listen command usually causes a single "at" sign (@) to appear on the screen. A new prompt appears on the screen, too, if the requesting port is not the affected port.

Error Messages:

"Insufficient privilege"
"Invalid Listen syntax"
"Invalid network manager syntax"
"Invalid <physical-address> syntax"

3.2.15 RESume Command

Syntax: RESume [<session number>]

Default Privilege Level: User

Description: The RESume command changes the local port from Command mode to Data Transfer mode, resuming communications for the specified session. If no session number is specified, the current session is resumed.

If the local port has just been notified that a queued connection is available, the RESume command completes the process of establishing the connection. The queued session has its own session number, which must be entered if a different session is active when the notification is received.

The RESume command is meaningful only if a completed or queued connection exists on a port.

Example 1:

```
resume
```

This example resumes Data Transfer mode for the current session.

Example 2:

```
res 2
```

This example resumes Data Transfer mode for session 2.

Normal Responses:

"Session <n> with <address> resumed"
"Queued session <n> connecting ... Access controlled
Group <n> password: "
"Queued session <n> connecting ... Session <n>
connected to <address>"

Error Messages:

"No current session"
"No other sessions"
"Illegal request -- wrong state"
"Invalid RESume syntax"
"Invalid session number"
"Queued session <n> connecting ... Timeout failure"
"Queued session <n> connecting ... No response"
"Queued session <n> connecting ... Remote is busy"
"Queued session <n> connecting ... Remote is disabled or nonexistent"

3.2.18 SET Command

Syntax: SET <param-name> = <value> ...
SET (<address>) DATE = mm/dd/yy hh:mm[:ss]

Default Privilege Level: User

Description: The SET command sets a configuration parameter value. The new value takes effect immediately, but remains in effect only for the current session. The SET command differs from the SETDefault command in that a parameter value specified with the SETDefault command takes effect only with the following session, then remains in effect until an explicit SETDefault or SET command overrides it.

The command "set ?" prints a list of all parameters that can be specified.

When multiple values are specified for a single parameter, the values must be separated by commas and enclosed in parentheses. If the parentheses are omitted, the server generates an error message, but the first of the multiple values is written to the active parameter table anyway.

The network manager form of the SET command can be used only to set the system clock. If any parameter other than DATE is specified in this form of the command, an error message is generated. In networks that include an NCS, the NCS automatically sets the system clock on each server in the network. However, SET DATE may be used on Communications Servers to set the date of all the servers on the network including the NCS, if necessary (i.e., in case of a time change, such as daylight savings). For networks that do not include an NCS, the date of the local server and all other servers in the network can be specified using the broadcast address (%ffffffffffff for XNS networks; 255.255.255.255 for TCP networks) in the SET DATE command. Section 3.1.5 defines the rules that govern the way parameter values are specified; Section 4.0 lists the parameters that can be specified with the SET and SETDefault commands.

On a server with internal disk drive, the network manager can change the privilege levels as required to execute commands. Do not establish a privilege level other than User for the SET command. Otherwise, no one will be able to access higher privilege levels, which is done only through the SET command.

3.2.20 SHow Command

Syntax: SHow <show-keyword> [<parameter> ...]
SHow (<address>) <show-keyword> [<parameter> ...]

Default Privilege Level: User

Description: The SHow command is used to display current parameter values and other system information.

Depending on customer requirements, some SHow keywords and some SHow parameters may be restricted to Local or Global Network Manager privilege. At the Global Network Manager privilege level, most of the SHow commands can take an Ethernet address before the keyword (see example 9, below). The displays generated by the SHow command are tailored to the privilege level of the requesting port.

The SHow keywords that are valid on an NCS in remote mode may differ from the keywords specified in the list below. The Network Control Server Installation and Operation Guides (references [6] and [7]) provide complete listings of SHow keywords for the NCSs.

The command "show ?" displays a list of the valid SHow keywords appropriate to the port's privilege level, indicating command format. When a keyword applies only to a particular server, the appropriate server is noted. Otherwise, the keywords listed are valid on both XNS and TCP servers.

SHow ADDRess
SHow AllSessions
SHow AttachedNets *
SHow CHNames [<name> [@ <domain> [@ <organ.>]]] *
SHow CONFigurations [<filename>]
SHow DATE
SHow [(<address>)] DefaultParameters [<param-name> ...]
SHow GLobalPARameters
SHow GRoupPassWords *
SHow InternetPorts **
SHow InternetServers [Global | Local] **
SHow MACros [<macro-name>]
SHow NAmes [<name>] **
SHow NetMap [Short | Long]
SHow [(<address>)] PARAmeters [<param-name> ...]
SHow <param-name> ...

---

* Valid only on XNS servers.

** Valid only on TCP servers.

```
SHow RemoteNets [ <netid> ... ] *
SHow ROtaries
SHow SECuritySTATistics
SHow [ (<address>) ] SESsions [P]
SHow (<address>) STATistics
SHow STATistics [ Sample | Minute | <hour> | Day ]
SHow VERSion
SHow VirtualPorts
SHow X25Addresses [ <netid> ] **
SHow X25Connection [ <line number> ] **
```

If the SHow command is entered with no keyword specified, the Connection Service assumes PARAmeters as the default keyword.

SHow ADDRess on all XNS servers displays the Ethernet address of the local server, the port number of the local port, the bootstrap source of the local server, and the time and date it was last booted. On the TCP servers, this command displays the port number and either the internet address (if one is assigned) or the words "active only".

SHow AllSessions displays a list of all physical ports on the server and their statuses. On TCP servers, the resulting list shows physical port numbers, not internet addresses. Use the SHow InternetPorts command to display the mapping between physical ports and internet addresses.

SHow AttachedNets displays the network number of the local Ethernet network. If the command is executed remotely on the Gateway Server, the system displays the network numbers of all Ethernet networks attached to the gateway. This command is not available on TCP servers.

SHow CHNames displays a list of clearinghouse names. The clearinghouse names represent physical addresses or sets of physical addresses on the system. To display the physical address that the clearinghouse name maps into, use the command SHow CHNames <clearinghouse names>.

Ordinarily, the SHow CHNames command displays only the clearinghouse names in the local clearinghouse whose domain and organization strings match the default domain and organ-

---

* Valid only on XNS servers.

** Valid only on the CS/1-X.25 or the GS/1.

ization strings for the local server. If some clearinghouse names have been established with unique domain and organization strings, the entire list can be displayed with this form of the command:

SHow CHNames *@*@*

For a server supported by an NCS, clearinghouse names are stored on the NCS*. The SHow CHNames command (without an argument) displays only those names with the same domain and organization strings as the server on which the command was entered. This command can be entered either locally or remotely on an NCS. If the servers have different default domain and organization strings, the resulting displays are different.

This command is available only on Communications Servers running the XNS protocols. The SHow NAmes command provides a similar function on servers running TCP/IP protocols. The NAmes keyword is described later in this section.

SHow CONFigurations displays a list of all configuration tables saved on the disk. The list of tables includes both default tables (those whose filenames consist of a port number) and alternate tables (those whose filenames consist of alphanumeric characters). SHow CONFigurations <filename> displays the contents of the parameter table contained in the specified file; both default and alternate tables can be displayed.

SHow DATE displays the current date and time. If the server boots from internal disk drive, DATE is typically set after each system boot with the SET command (discussed in Section 3.2.18). If the server is supported by an NCS, DATE does not need to be reset.

---

* If a non-client server is in the network, it can have its own name database.

SHow DefaultParameters displays the default parameters for the specified port or, if no port is specified, for the port on which the command is typed. To display a few specific default parameters, type the command and keyword followed by the names of the parameters. To display a list of all default parameters, type the command and keyword only. During remote access to another server, the SHow DefaultParameters command must include a port number; if none is specified, the system displays the remote server's global parameters instead.

SHow GLobalPARameters displays the global parameters discussed in Section 4.1.5 for asynchronous ports and in Section 4.2.5 for virtual ports on the GS/1. (except for the access group passwords). The display is tailored to the privilege level of the requesting port.

SHow GRoupPassWords displays a list of all 16 access groups and their passwords to the user with global network management privilege level. This command is available only on XNS servers.

SHow InternetPorts displays the internet address and Ethernet address of the local server, as well as the mapping of physical ports and rotary numbers to internet addresses. This command is valid only on TCP servers.

SHow InternetServers displays the internet addresses of the Name Servers, the Local Gateway, the BootServer, and the AUditServers on the TCP network. This command is valid only on TCP servers.

SHow MACros without an argument displays a list of all macros defined for the local server (if the server boots locally) or a list of all shared macros (if the server boots from an NCS). SHow MACros <macro-name> displays the contents of the specified macro.

SHow NAmes displays a list of internet names. The names represent internet addresses or sets of addresses on the TCP/IP system. To display the internet address that the name maps into, use the command SHow NAmes <internet name>. This command is valid only on TCP servers.

SHow NetMap displays a list of the addresses of all Bridge servers on the network that run the same set of high-level protocols as the server on which the request is entered (e.g., from a TCP server, the list includes only TCP servers). The first address in the list is always the local server.

If the command includes the additional keyword "Long"*, the resulting list also indicates the software release number of any server on the network running SW/1-A/BSC/SDLC Release 20000 or higher or SW/100-A/BSC Release 15000 or higher.

On a Series/1 server, a maximum of 80 addresses are included in the display; on a CS/100, a maximum of 40 addresses are included. Any server that has been down for 5 minutes or longer is indicated in the list as inactive; after the server has been inactive for 72 hours, it is removed from the netmap list.

The SHow PARAmeters command is like the SHow DefaultParameters command, except that it displays the parameters for the current session. If no connection has been established, the display includes only the port parameters, since no session parameter table exists for a port without sessions. The keyword PARAmeters can be omitted from a request for one or more specific parameters. That is, the command "SHow BAud", is equivalent to the command "SHow PARAmeters BAud". During remote access to another server, the SHow DefaultParameters command must include a port number; if none is specified, the system displays the remote server's global parameters instead.

SHow RemoteNets displays a list of all networks available through gateways on the local network. If the keyword is followed by a network identification number, the system displays the Ethernet addresses of the Gateway Servers through which that network can be accessed. This command is not valid on TCP servers.

SHow ROtaries displays a list of rotary numbers and the ports that have been assigned to them. For TCP servers, the list indicates physical port numbers, not internet addresses. Use the SHow InternetPorts command to display the mapping between port numbers and internet addresses.

---

* Unavailable on CS/100.

SHow SECurity STATistics is valid only on XNS servers. The command displays a summary of security-related activity (privilege level and access control) since the most recent system boot. The report is discussed in detail in the Network Management Guide (reference [10]).

SHow SESsions displays a list of all current connections between the specified port and other destinations. On an asynchronous server, if the final argument "P" is included, the resulting report shows the physical address of the circuit destination instead of its logical name.

The SHow STATistics command can take either of two distinct forms. If it is used without a final argument, SHow STATistics displays a summary of the statistics for the specified port or, if no port is specified, for the port on which the command is typed. If it is used with one of the four closing arguments (Sample, Min, <hour>, Day), the command displays one of the network management reports for the entire server. The Network Management Guide (reference [10]) includes a complete discussion of statistics reports.

SHow VERSion displays the software release number and date of the software currently running on the server, the firmware release numbers of all PROMs in the server, and the time, date, and source of the most recent bootstrap. See Section 2.5 for a description of software and firmware release numbers.

SHow VirtualPorts displays the connection status (passive or active) of the virtual ports, and to which physical ports the virtual ports are connected. Section 2.3.3 discusses virtual ports.

SHow X25Addresses is valid only when issued remotely or directly to a CS/1-X.25 or GS/1. The command displays the Ethernet number and X.25 address of each remote Ethernet accessible from the CS/1-X.25 or GS/1 on which the command is issued.

SHow X25Connection is valid only when issued remotely or directly to a CS/1-X.25 or GS/1. The command displays a list of the currently active logical channel numbers, local X.25 addresses, and remote X.25 addresses associated with each line on the CS/1-X.25 or GS/1 on which the command is issued.

3.2.21 SWitch Command

Syntax: SWitch [<session number>]

Default Privilege Level: User

Description: The SWitch command is used to suspend the current session and switch the user device to another session on the port. A session is referred to by its session number. If no session number is specified, the most recently active session becomes active. The port remains in Command mode until the RESume command is entered.

Example:

switch 2

This example requests that the current session be suspended and session 2 be activated.

Normal Responses:

"Switching ... to session <n>"

Error Messages:

"Invalid session number"
"No other sessions"
"Invalid SWitch syntax"

Appendice B. Tabelle di corrispondenza Terminali TTY - IBM3278 per il server CS/1-SNA

Table 2-2 IBM 3101 Key Correspondence

Display Station Function	IBM 3101 Keys	Display Station Function	IBM 3101 Keys
PF1	PF1 CTRL-c	Right	Right Arrow
PF2	PF2 CTRL-c	Left	Left Arrow or BACKSPACE
PF3	PF3 CTRL-c		
PF4	PF4 CTRL-c	Up	Up Arrow
PF5	PF5 CTRL-c	Down	Down Arrow
PF6	PF6 CTRL-c		
PF7	PF7 CTRL-c	Attention	ESC n
PF8	PF8 CTRL-c	Back Tab	ESC TAB
PF9	ESC 9	Clear	CLEAR
PF10	ESC 0	Delete	DEL
		Device Cancel	ESC x
PF11	ESC PF1 CTRL-c	Duplicate	ESC .
PF12	ESC PF2 CTRL-c	Enter	RETURN
PF13	ESC PF3 CTRL-c	Erase Input	ERASE INPUT
PF14	ESC PF4 CTRL-c	Erase EOF	ESC EOF
PF15	ESC PF5 CTRL-c	Field Mark	ESC m
PF16	ESC PF6 CTRL-c	Home	ESC h
PF17	ESC PF7 CTRL-c	Insert Mode	ESC i
PF18	ESC PF8 CTRL-c	PA1	ESC 1
PF19	ESC ESC 9	PA2	ESC 2
PF20	ESC ESC 0	Print	ESC p
		Reset	ESC r
PF21	ESC ESC PF1 CTRL-c	System Request	ESC s
PF22	ESC ESC PF2 CTRL-c	Tab	TAB
PF23	ESC ESC PF3 CTRL-c	Update Screen	CTRL-u
PF24	ESC ESC PF4 CTRL-c	Toggle last line	CTRL-t

Table 2-3 TeleVideo 925 Key Correspondence

Display Station Function	TeleVideo Keys	Display Station Function	TeleVideo Keys
PF1	F1	Right	Right Arrow
PF2	F2	Left	Left Arrow or BACKSPACE
PF3	F3		
PF4	F4	Up	Up Arrow
PF5	F5	Down	Down Arrow
PF6	F6		
PF7	F7	Attention	ESC a
PF8	F8	Back Tab	BACKTAB
PF9	F9	Clear	ESC c
PF10	F10	Delete	DEL
		Device Cancel	ESC x
PF11	SHIFT-F1	Duplicate	ESC d
PF12	SHIFT-F2	Enter	RETURN
PF13	SHIFT-F3	Erase Input	ESC e
PF14	SHIFT-F4	Erase EOF	ESC DEL
PF15	SHIFT-F5	Field Mark	ESC m
PF16	SHIFT-F6	Home	HOME
PF17	SHIFT-F7	Insert Mode	ESC i or F11
PF18	SHIFT-F8	New Line	LINE FEED
PF19	SHIFT-F9	PA1	ESC 1
PF20	SHIFT-F10	PA2	ESC 2
		Print	ESC p
PF21	ESC F1	Reset	ESC r
PF22	ESC F2	System Request	ESC s
PF23	ESC F3	Tab	TAB
PF24	ESC F4	Update Screen	CTRL-u

Table 2-4 DEC VT100 and VT200* Key Correspondence

Display Station Function	VT100 or VT200 Keys	Display Station Function	VT100 or VT200 Keys
PF1	ESC 1	Right	Right Arrow
PF2	ESC 2	Left	Left Arrow or BACKSPACE
PF3	ESC 3		
PF4	ESC 4	Up	Up Arrow
PF5	ESC 5	Down	Down Arrow
PF6	ESC 6		
PF7	ESC 7	Attention	ESC a or PF3
PF8	ESC 8	Back Tab	ESC TAB
PF9	ESC 9	Clear	ESC c
PF10	ESC 10	Delete	DEL
		Device Cancel	ESC x
PF11	ESC ! (SHIFT-1)	Duplicate	ESC d
PF12	ESC @ (SHIFT-2)	Enter	RETURN
PF13	ESC # (SHIFT-3)	Erase Input	ESC e
PF14	ESC $ (SHIFT-4)	Erase EOF	ESC DEL
PF15	ESC % (SHIFT-5)	Field Mark	ESC m
PF16	ESC ^ (SHIFT-6)	Home	ESC h
PF17	ESC & (SHIFT-7)	Insert Mode	ESC i or PF4
PF18	ESC * (SHIFT-8)	New Line	LINE FEED
PF19	ESC ((SHIFT-9)	PA1	PF1
PF20	ESC) (SHIFT-0)	PA2	PF2
		Print	ESC p
PF21	ESC ESC 1	Reset	ESC r
PF22	ESC ESC 2	System Request	ESC s
PF23	ESC ESC 3	Tab	TAB
PF24	ESC ESC 4	Update Screen	CTRL-u
		Toggle last line	CTRL-t

* The DEC VT200 must be in VT100 emulation mode.

Table 2-6 IBM Personal Computer* Key Correspondence

Display Station Function	IBM PC Keys	Display Station Function	IBM PC Keys
PF1	ALT-1	Right	Right Arrow
PF2	ALT-2	Left	Left Arrow or Backspace
PF3	ALT-3		
PF4	ALT-4	Up	Up Arrow
PF5	ALT-5	Down	Down Arrow
PF6	ALT-6		
PF7	ALT-7	Attention	F1
PF8	ALT-8	Back Tab	Shift-Tab
PF9	ALT-9	Clear	F7
PF10	ALT-0	Delete	DEL
		Device Cancel	F10
PF11	ALT-- (minus)	Duplicate	PGDN
PF12	ALT-= (equal)	Enter	+ (plus)
PF13	ALT-q	Erase Input	F5
PF14	ALT-w	Erase EOF	F6
PF15	ALT-e	Field Mark	PGUP
PF16	ALT-r	Home	HOME
PF17	ALT-t	Insert	INS
PF18	ALT-y	New Line	Enter
PF19	ALT-u	PA1	F3
PF20	ALT-i	PA2	F4
		Print	F9
PF21	ALT-o	Reset	F8
PF22	ALT-p	System Request	F2
PF23	ALT-a	Tab	Tab
PF24	ALT-s	Update Screen	- (minus)
		Toggle last line	END

* This key correspondence is applicable only when the IBM PC is emulating an asynchronous terminal over the Ethernet network.

Appendice C. Tabelle di corrispondenza PC - IBM3278/Heath H19 per il pacchetto TCP/IP for the PC

Note: Keys to be pressed in sequence are separated by a single space. For example:

ESC 1 indicates that you press the ESC key, release it, and then press the number one.

Note: Keys separated by a hyphen are to be pressed simultaneously.

Shift-F1 *means that you press the Shift key and hold it down as you press the F1 key.*

The table presents the IBM 3270 functions and their PC counterparts. You can change the PC keystrokes by using TCP/IP Bind command (see "Bind Command" on page 4-3).

IBM 3270 keys are simulated on a PC as follows:

- PF01 -- Function key F1; ESC 1
- PF02 -- Function key F2; ESC 2
- PF03 -- Function key F3; ESC 3
- PF04 -- Function key F4; ESC 4
- PF05 -- Function key F5; ESC 5
- PF06 -- Function key F6; ESC 6
- PF07 -- Function key F7; ESC 7
- PF08 -- Function key F8; ESC 8
- PF09 -- Function key F9; ESC 9
- PF10 -- Function key F10; ESC 10
- PF11 -- Alt-F1; ESC -
- PF12 -- Alt-F2; ESC
- PF13 -- Shift-F1
- PF14 -- Shift-F2
- PF15 -- Shift-F3
- PF16 -- Shift-F4
- PF17 -- Shift-F5
- PF18 -- Shift-F6
- PF19 -- Shift-F7
- PF20 -- Shift-F8
- PF21 -- Shift F3
- PF22 -- Shift-F10
- PF23 -- Alt-F3
- PF24 -- Alt-F4
- reset -- Ctrl-g
- tab -- Tab; ESC-right (keypad)
- newline -- Ctrl-Enter
- home -- Home (keypad); ESC Shift-h; ESC h
- enter -- Enter
- escape -- Ctrl-^]; Ctrl-F10
- space -- space
- delete -- Del
- backtab -- Shift-tab; ESC ← (backspace key); ESC tab; ESC left (keypad)

- PA1 -- Alt-F9; ESC ,
- PA2 -- Alt-F10; ESC .
- PA3 -- Alt-F8; ESC /
- up -- Pg Up (keypad); ESC Shift-u; ESC u
- left -- ← (backspace key); left (keypad); ESC Shift-1; ESC 1
- right -- right (keypad); ESC Shift-r; ESC r
- insert -- Ins; ESC Shift-i; ESC i
- eof -- End (keypad); ESC Shift-e; ESC e
- eoi -- Ctrl-End; ESC Ctrl-e
- down -- Down (keypad); ESC Shift-d; ESC d
- fast_left -- Ctrl-left
- fast_right -- Ctrl-right
- clear -- Alt-c; ESC Shift-c; ESC c
- centsign -- Alt-4; ESC \

Emulation of a Heath H19 Keyboard

The following conventions allow the PC keyboard to behave as a Heath H19 keyboard:

- There is no repeat key. To repeat any key, hold it down.
- The function keys are keys F1-F5.
- The color keys are F6(blue), F7(red) and F8(gray).
- The Heath H19 has separate keys for ASCII Carriage Return and ASCII Line Feed. These two functions are combined on the PC Enter key. To send an ASCII CR, press the Enter key. To send an ASCII LF, use Ctrl-Enter.
- The Heath H19 has separate keys for ASCII Backspace and ASCII Delete. These two functions are combined on the PC Backspace key. To send ASCII DEL, press ←(backspace). To send ASCII BS, use Ctrl-←. A customization option and a Ctrl-] escape allow interchanging backspace and control-backspace. For convenience, the keypad key, Del, also sends an ASCII DEL.

Note: The emulator exactly emulates the Heath H19 line wraparound feature. That is, in line wraparound mode, the emulator automatically goes to the next line after placing a character in column 80, rather than waiting to see if the program or user attempts to put something in column 81.

Heath H19 Features Not Emulated

hold screen/scroll	keyclick disable
graphics	keyboard disable
shifted keypad	block cursor
alternate keypad	AutoCR
identify as VT-52	AutoLF

Figure 4-7 (Part 1 of 2). Heath H19 Features Not Emulated

Appendice D. Indirizzi Internet e nomi simbolici

Indirizzo	Nome	Macchina	Utente	Note
192.12.192.001			Gennai	[1]
192.12.192.002	vm	IBM DACU	Gennai	
192.12.192.004		Sun	Bonito	[2]
192.12.192.030		Digital VAX	Gennai	[3]
192.12.192.129		Spider Port	Carlesi	
192.12.192.130		Bridge LS/1	Montani	
192.12.192.131	cnucell			
192.12.192.132		Bridge CS/1-SNA	Montani	
192.12.192.133	cnucefs			[4]
192.12.192.134	portprint			
192.12.192.135	gouldu	Sel Gould 32/67	Azzarelli	
192.12.192.136	gouldm	Sel Gould 6040/H	Azzarelli	
192.12.192.140	veggia	IBM PC AT/2	Montani	
192.12.192.141	china	IBM PC AT/2	Bertino	
192.12.192.142	salvetti	PC AT Comp.	Salvetti	
192.12.192.143		Olivetti M280	Carlesi	
192.12.192.144		IBM PC AT/2	Lami C.	
192.12.192.145		Olivetti M280	Lami V.	
192.12.192.146		Apple MAC II	Fusani	
192.12.192.147		IBM PC AT/3	Vaccarelli	
192.12.192.148		IBM PC AT/2	Biagi	
192.12.192.149		IBM PC AT/2	Grandoni	
192.12.192.150	enrico	IBM PC AT/3	Fantini	
192.12.192.155		IBM PC AT/2	Rabitti	
192.12.192.160	lilly	SUN 3/60	Rabitti	
192.12.192.161	amadeus	SUN 3/70	Bertino	
192.12.192.162	dulcinea	SUN 3/75	Meghini	
192.12.192.163	ieipisa	SUN 3/180	Fantechi	
192.12.192.164	bach	SUN 3/50	Fantechi	
192.12.192.165	mascagni	SUN 3/70	Fantechi	
192.12.192.166	rtibm	IBM 6150	Carlesi	

Note

[1] Deve essere indicato come Default Gateway da tutti gli utenti che necessitano di collegamento in rete internazionali quali SATNET, ARPANET, NFS, etc.

[2] Questa workstation SUN e' Domain Server, Time Server e Primary Name Server per gli utenti del CNUCE. La risoluzione di un nome simbolico da parte del server puo' essere richiesta soltanto aggiungendo al nome il suffisso cnuce.cnr.it (al posto del nostro suffisso iei.cnr.it).

[3] Puo' essere utilizzata come Secondary Name Server e/o Time Server.

[4] Svolge anche funzione di Name Server locale ma, dovendo comunque tenere aggiornato il Primary Name Server del CNUCE, per cio' che di nostra competenza, sara' prossimamente sostituito (per questa funzione) dal server 192.12.192.4.