

APPLICATION NOTE: Managing Multi-Shelf 360-80 System

Of the three management interfaces that can be used to provision the 360-80 shelf, two of them can be used to manage a multiple shelf system. Network Management System, NMS (utilizes a Graphical User Interface, GUI) and Network Node Manager (utilizes Simple Network Management Protocol, SNMP) are designed to allow management of a group of 360-80 shelves. The management software for the 360-80 uses the 'Address ID' switch on the front panel of the T1/E1 Controller module and the provisioned IP address (See Craft interface documentation for provisioning the IP address of the T1/E1 Controller) to determine shelf selection in a multi-shelf system.

Recommended Configuration for Management of a multiple 360-80 shelf system using NMS (GUI)

If there are multiple local 360-80 shelves managed by a single NMS manager then the IP address of each of the local controllers in the shelves must be different (See Craft interface documentation for provisioning the IP address of the T1/E1 Controller). It is recommended that the all of the local controller's Address ID switch be set to '0'. **Remember that a 'local' controller is any controller that is connected via Ethernet to the NMS manager.** (See practices for NMS for address switch setting procedures). Using this configuration, under the 'Database' section the entries in the 'Equipment Management' table would show that the addresses would be '1' (using the formula that the address is '1' plus the Address ID switch setting). The user can then enter the description of the equipment and the different IP addresses for each controller.

A remote controller connected over a T1/E1 to a local controller can be managed through the local controller. This requires the 'remote control method' be enabled when provisioning the local and remote T1/E1 Controllers. With the local controller set as described above, it is recommended that the Address ID switch for a remote controller be set to '1'. Because the NMS database equipment address is based on the remote controller's Address ID switch setting times 16 plus the address of the local controller, the address entry in the 'Equipment Management' table would be 17 and the IP address would be the IP address of the **local** controller. The combination of the unique IP address of the local controller and the management address allows the user to identify which of the controllers/shelves should be responding to management activities. When setting parameters at the remote controller, the IP address setting at the remote controller is not used for controller management over the T1/E1.

For drop and insert applications (T1 Controllers only), there are multiple remote controllers managed from a single local controller. All controllers must have a 'remote control method' enabled to each remote controller. With the local controller set as described above, it is recommended that each remote controller's Address ID switch setting be based on the number of T1s between the remote controller and the local controller, up to the maximum of 7. This would indicate that a remote controller connected over a T1 to a controller whose Address ID switch is set to 2 would have its Address ID switch set to 3. All remote controllers that are managed through a local controller must have a different Address ID switch setting from any of the other remote controllers managed through the local controller. Entries into the 'Equipment Management' table should have the management address for the remote controllers calculated using the formula; (management address) = (Address ID switch setting) times 16 plus 1. The IP address for all shelves managed though a local controller would be the IP address of the local controller.

Location of Controller	Controller's IP Address	Address ID Switch Setting	NMS Database Address	NMS Database IP Address
Local	Unique for all controllers	Set to '0'	Enter as '1'	Local Controller's IP Address
Remote	Not Used	Set to '1'	Enter as '17'	Local Controller's IP Address

D&I Remotes (T1 only)	Not Used	Set to '2, 3, 4, 5, 6, or 7'	Enter 'ID' x 16 + 1	Local Controller's IP Address
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Recommended Configuration for Management of a multiple 360-80 shelf system using NNM (SNMP)

If there are multiple local 360-80 shelves managed by a single NNM or SNMP manager, then the IP address of each of the local controllers in the shelves must be different (See Craft interface documentation for provisioning the IP address of the T1/E1 Controller). It is recommended that all of the local controller's Address ID switch be set to '0'. **Remember that a 'local' controller is any controller that is connected via Ethernet to the SNMP Network Node Manager.** (See practices for NNM for address switch setting procedures). It is recommended for the local controller parameters that the community parameter be set to 'private', the privilege be set to 'Read Write', the IP address parameter be set to the IP address of the NNM manager and the subnet mask be set to match network architecture. When using this configuration, the community used by the NNM manager would be 'private@1' for management of all local shelves. This community consists of 'private' indicating the community and '1' indicating the 'community key', which is the setting of the Address ID switch plus 1. The NNM uses the local controller's IP address to distinguish between local shelves.

A remote controller connected over a T1/E1 to a local controller can be managed through the local controller over the T1/E1 link if a 'remote control method' is enabled when provisioning the T1/E1 Controller. It is recommended that the Address ID switch for a remote controller be set to '1'. Because the community name is based on the community, the IP address of the local controller and the 'community key' (which is based on the Address ID setting plus 1), the community used by the NNM would use the IP of the **local** controller and the 'community key' of the remote controller to be accessed. All remote controllers can have the same switch setting because each controller's local shelf has a unique IP address. Using this procedure, if the community name was set to 'public' in the community table, then the community used by the NNM manager would be 'public@2' for management of all remote shelves. Remember when setting up the NNM manager for management of remote shelves, the IP address is the IP address of the local controller. When setting parameters at the remote controller, the IP address and the community table settings at the remote controller are not used for controller management over the T1/E1.

For drop and insert applications (T1 Controllers only) there are multiple remote controllers that can be managed from a single local controller. All controllers must have a 'remote control method' enabled to each remote controller. It is recommended that each remote controller's Address ID setting be based on the number of T1s between the remote controller and the local controller. This would indicate that a remote controller connected over a T1 to a controller whose Address ID switch is set to 2 would have its Address ID switch set to 3. All remote controllers must have a different Address ID switch setting from its local controller or any of the other remote controllers managed over its T1s. Using this procedure, if the community name was set to 'public' in the community table, then the community used by the NNM manager would be 'public@4' ('community key' is based on the Address ID setting plus 1). Remember when setting up the NNM manager for management of remote shelves, the IP address is be the IP address of the local controller.

Location of Controller	Controller's IP Address	Address ID Switch Setting	Community Key	Traps Available
Local	Unique for all controllers	Set to '0'	1	Yes
Remote	Not Used	Set to '1'	17	No
D&I Remotes (T1 only)	Not Used	Set to '2, 3, 4, 5, 6, or 7'	'ID' x 16 + 1	No

Management of a multiple 360-80 shelf system in a 'STAR' Configuration

Some system architectures require management of multiple 360-80 shelves at remote locations that have no 'local' shelf. One such application would have multiple 360-80 shelves connected to a DACS (Digital Access and Cross-connect System). In this application, access to the management ports would only exist at the remote locations if no provisions were made to extend the management LAN to these remote locations. To manage this type of shelf system, the management ports would need to be transported back to the central location. At the central location, if all of the management channels were cross-connected to a single TI, then there would need to be systems to convert the management channels into Ethernet and connect to the local LAN.

The remote Ethernet management ports can be transported back to a central location using 'spare' voice or data circuits from the remote shelves back to the central location. All controllers must be optioned to select a channel as the remote control channel. This approach does require external equipment (both at the remote site and at the local location to break-out the management channels) but will provide the ability to manage all of the remote shelves from a central location. This management can be either NMS or NNM. Once all management ports have been connected together at the central location, all shelves can be managed as 'local' shelves. This means that each controller is configured as a 'local' controller as described in the first portion of this application note.

If the 'spare' circuits are FXS or E&M/TO, then use of a router with an analog modem will provide connectivity from the remote location to the central site. At the central site a second router with an analog modem will terminate at an FXS or E&M card for the point-to-point connection. At the central site a LAN can be created to connect each of these Ethernet routers.

If the 'spare' circuits are DSU (from 2.4Kbps to a 64xN Kbps circuit) then use of a router with a serial port will provide the connectivity from the remote location to the central site. At the central site a second router with a serial port will terminate the point-to-point connection. At the central site a LAN can be created to connect each of these Ethernet routers.

If the 'spare' circuits are OCU (from 2.4Kbps to a 64 Kbps circuit) then use of a router with a 4-wire DDS port will provide the connectivity from the remote location to the central site. At the central site use a DSU card and a second router with a serial port to terminate the point-to-point connection. At the central site a LAN can be created to connect each of these Ethernet routers.

Alternate Management of a shelf system in a 'STAR' Configuration

If viewing a single shelf at a time is acceptable, then there is a second method to manage multiple shelves. In this application a DACS or similar equipment is used to 'dress' all of the management channels from the remote shelves to 'local' shelves. The remote shelves would be provisioned as described in the previous 'star' configuration. The 'local' shelves can then manage a single remote shelf by setting the local shelf's 'remote management method' as 'occupy a single channel'. Then by changing the channel being used to communicate for the local shelf, different remote shelves can be managed.

Management of a 360-80 shelf in a 'dial-up' Configuration

The remote shelves can also be managed in a 'dial-up' configuration with a modem at each remote site connected to the craft interface port. In this configuration, only one shelf can be viewed or managed at a time. To allow the unit to answer a dial-up modem an adaptor must be created that allows for the receive data lead (pin 4 of RJ-11) to the craft interface to remain open while the modem answers and is connected. This adaptor must be a crossover adaptor (Xmt <-> Rcv). After the modem answers, then the receive data lead can be connected and normal operation will occur. The adaptor can use the Data Carrier Detect (DCD) lead to control this relay. Connect the DCD lead to the '-' lead on the relay. Connect the '+' lead on the

relay to signal ground through a resistor to limit the current (based on relay specification). The Data Set Ready (DSR) should be tied to the Request to Send (RTS) and the Data Terminal Ready (DTR).