



# Smart DeskStream Token Ring Switch



## Smart DeskStream Objectives

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- **At the end of this session you will be able to:**
  - **Describe the Smart DeskStream features**
  - **Demonstrate its connectivity options, including:**
    - Ports and LEDs
    - Stacking module
    - TR fiber module
    - HSTR modules
  - **Explain the DeskStream's management options using**
    - TrueView/32 & DeskStream Manager
    - Command Line Interface
    - Power on self test diagnostics

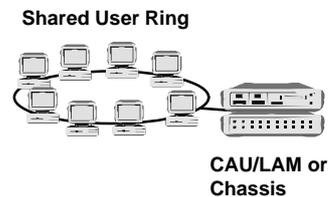
Smart DeskStream Technical Presentation 2



## What is Desktop Switching ?

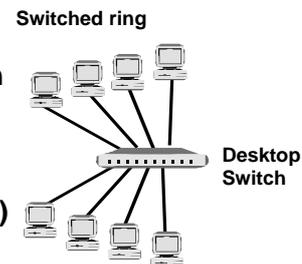
### Conventional *Shared* Token Ring

- Users share the Token Ring network
- Often up to 80 users share 16Mbps



### Fully Switched Token Ring

- Each user has their own dedicated Token Ring !
- No need to share 16Mbps with other users
- Connections can be Full Duplex (32Mbps)



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The CAU/LAM is the ring. Users share the bandwidth available on that ring - typically 16Mbps these days.

A ring can support over 250 users in theory, but in practice this number is better limited to around 80. Even at this reduced number, power users may suffer from 'bandwidth starvation'! The DeskStream allows them to each have a full 16Mbps since each port is its own ring. If the adapter driver will support it, the connection can be full duplex DTR which allows a maximum throughput of 32Mbps.



## Smart DeskStream Product Overview

- **Designed as a shared hub replacement**
- **1 U high**
- **24 ports with auto ring speed and protocol detect**
- **Plug 'n' Play installation**
- **Easily stacked to offer up to 192 ports**
- **High performance switching**
- **Simple, graphical management**

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The DeskStream is a workgroup switch, i.e. There is no internal ring - data is switched between ports. It is designed to replace the shared medium hubs e.g. CAUs and RAMs.

It is 1U high which saves space in the rack. The racking lugs are user installable since it can be a free standing unit as well.

By default all ports are speed detecting and can also negotiate full duplex or classic mode token ring. Both of these parameters can be manually configured if necessary.

In general, the default setting allows us to connect it up and it just works.

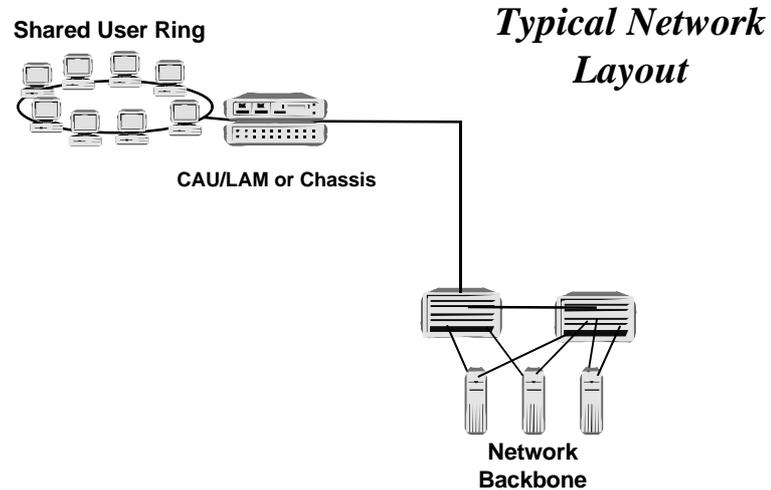
Up to eight DeskStreams can be stacked using the stacking bus; this means that a single stack can support up to 192 workstations in a completely switched environment. The stack can also support up to 16 uplink ports.

All ports can - providing that the drivers support it - run in full duplex DTR mode.

Managing via the Trueview GUI is straightforward. Each stack shows as a single icon; opening the icon reveals each DeskStream and allows them to be managed individually.



## Easy Integration into existing networks



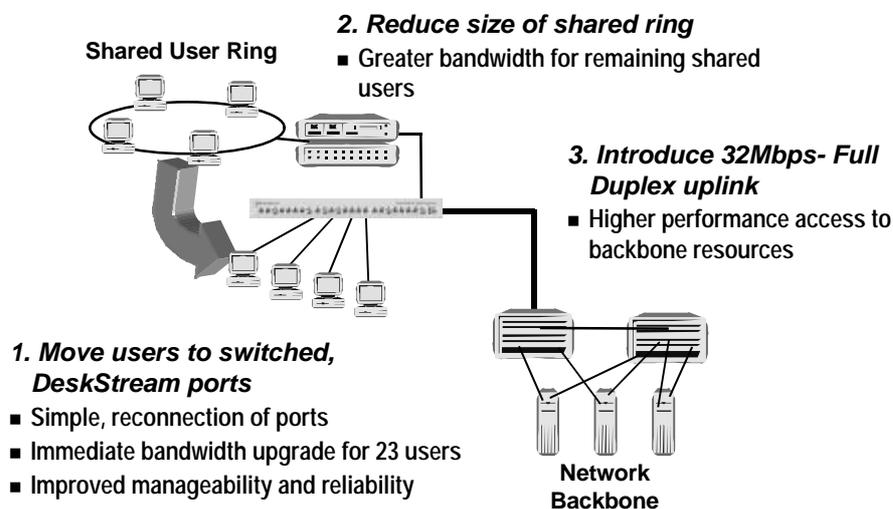
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The slide shows part of a typical network, with CAUs providing a shared medium interface for the workstations. The CAUs are connected to Ringswitches as are the servers.

Ultimately some users will complain of slow responses especially as both programs and data files get bigger.



## Easy Integration into existing networks



Smart DeskStream Technical Presentation 6

Switching to the workgroup can help alleviate this problem.

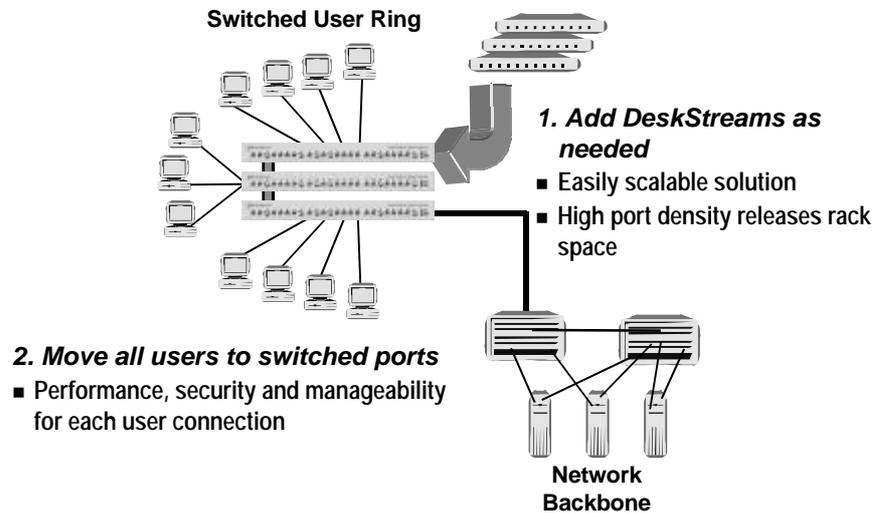
The DeskStream can be connected between the CAU and the Ringswitch using the single Master (or node) port (24) on the DeskStream to connect to the CAU and one of the Direct (or concentrator) ports, or an uplink port to connect to the Ringswitch.

Once the DeskStream is connected and operational, the power users can be moved across simply by moving the cable connection - no other configuration activity is required. These users now get a dedicated connection and will also release bandwidth for the workstations remaining on the shared medium ring.

CAUs and RAMs can't use full duplex DTR, but the DeskStream can! So the uplink to the Ringswitch is a more efficient link than the original CAU link.



## Easy Integration Hub Replacement



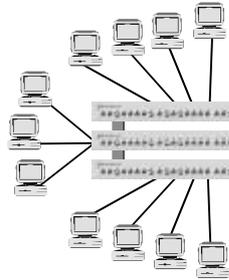
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As time and money permits, the remaining workstations can be phased over to a switched environment as more DeskStreams are installed and stacked.



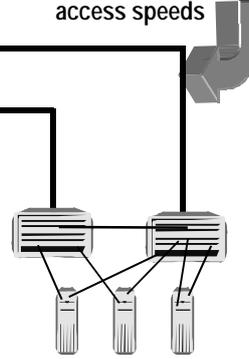
## Powerful, Flexible Connectivity Resilience

### Switched User Ring



### 1. Add additional links to backbone

- Resilience, load sharing and higher access speeds



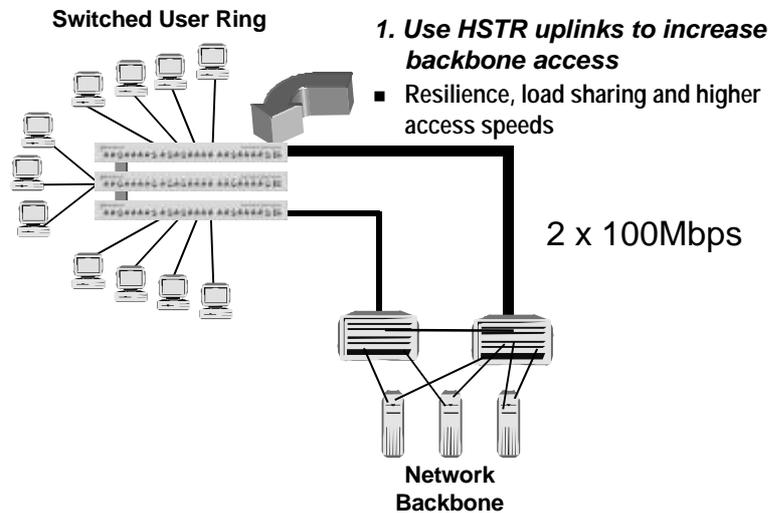
### Network Backbone

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CAUs can be connected to two Ringswitches to give a resilient link, so can the DeskStream, either as a standalone device or, as shown in the slide, as part of a stack.



## Powerful, Flexible Connectivity Resilience and Performance



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If bandwidth still needs to be extended, the DeskStream supports HSTR uplink modules - both copper and fibre. These only work as a point to point full duplex link and so potentially will allow a 200Mbps connection.



## **Smart DeskStream Family Summary**

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### **Smart DeskStream Token Ring Switch**

- 24 workstation ports with two module slots

### **Smart DeskStream Stacking Module**

- One required for each DeskStream to be stacked

### **Smart DeskStream TR Fibre Module**

- Dual ports, 4, 16Mbps and DTR, load sharing and redundancy

### **Smart DeskStream HSTR Copper Module &**

### **Smart DeskStream HSTR Fiber Module**

- Dual ports, 100Mbps, load sharing and redundancy

Smart DeskStream Technical Presentation 10



## **Smart DeskStream Background Positioning**

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### **Smart DeskStream behaves like a hub**

- **When integrating DeskStream into an existing network, use it as if it was a CAU/LAM.**

### **Smart DeskStream is designed for simplicity**

- **DeskStream offers full auto-configuration for simple installation**



## Smart DeskStream Background Positioning

- **Smart DeskStream is NOT designed as a backbone applications switch**
  - You can only support a shared device on one port
  - It does NOT offer Active Broadcast Control, full RMON or protocol filtering.
    - These are backbone features, not required at the workgroup level
  
- **Smart Ringswitch Family is for backbone solutions**
  - DeskStreams and Ringswitches can be integrated to provide a TR switching solution

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As we saw in the slides on integrating into an existing network, the DeskStream has only one workstation port which is capable of being connected to a shared medium hub.

Uplink ports can be connected to CAUs either as nodes or ,if using fibre, as RI/RO ports. This connectivity option is not recommended.



# **Smart DeskStream Token Ring Switch**

**Connectivity**



## Connectivity Ports

- **24 RJ45 ports**
  - Each behaves **EXACTLY** like a shared hub port
  - Each port has its own **MAC** address
  - **Ports 1 - 23** are *direct*, each can be connected to
    - Adapters
    - Bridges/ Routers
    - Backbone TR switches
  - *Direct* ports are also known as *slave* or *concentrator* (on Ringswitches) ports



Smart DeskStream Technical Presentation 14

The DeskStream workstation ports are RJ45 connectors and are ports which work like a shared medium hub port, i.e. in classic mode they will require the phantom drive to be present.

Each port has its own MAC address, so whether working in classic mode or full duplex DTR the connection there will be only two addresses on the link.

Ports 1 - 23 are called **direct** ports and are similar to **concentrator** ports on a Ringswitch. (They are also sometimes known as 'slave' ports). They will accept a connection to a TR adapter, a bridge or router port or a Ringswitch port set up as a node.



## Connectivity

### Ports - 2

- 24th RJ45 port
  - 24th port is a master, and can be
    - connected to a shared Hub port (any type/vendor)
    - re-configured as a direct port
  - Master port is also known as *node* (on Ringswitches)
  - Master port can therefore be configured as *node* or *concentrator*, similar to a Ringswitch port



Smart DeskStream Technical Presentation 15

Port 24 is configurable, but by default it is a **master** (or **node**) port. This can be connected to a CAU (or RAM) port or to a Ringswitch port that is in concentrator mode.



## Connectivity

### Ports - 3

- **Ring Speed / Protocol Detect**
  - **Each port supports 4Mbps, 16Mbps and Full Duplex (Dedicated TR)**
    - Default is auto speed sensing
    - Ring speed may be manually configured on a per port basis
  - **Impedance is matched to support UTP/STP cabling**
    - No requirement for a separate media filter / Balun
  - **Negotiates Classic TR or full duplex DTR on insertion**



The port can be given a name and the ring speed and protocol can be left as Auto or can be configured manually. The port can also be enabled or disabled. No other port parameters (except port mode on port 24) can be configured.



## Connectivity

### Ports - LEDs

- **Left Port LED:**
  - Green - Port open
  - Flashing green - Disabled
- **Right Port LED:**
  - Red - Port closed
  - Flashing red - Error
  - **Port 24 will flash red by default (because it is master as default)**



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*Left LED* - flashing green; disabled by management software

*Right LED* - red. This happens when a connection is made against the configured set up e.g. workstation connects with a non DTR driver into a manually configured DTR port



## Connectivity Status LEDs

- **First LED on right of unit - Status**
  - Green - Normal operation
  - Flashing green - Diagnostic self test
  - Red - Error
    - System Failure
  - Flashing Red - Warning
    - E.g. Fan Failure



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*System failure* - e.g. CPU crash i.e. will require a replacement DeskStream

*Warning* - failure which allows the DeskStream to continue working, at least temporarily.



## Connectivity

### Status LEDs - 2

- **Second LED, Module Link 1**
  - Green - Port open
  - Red - Port closed
  - Flashing green - Disabled
  - Flashing red - Error
- **Third LED, Module Link 2 - As for Link 1**



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Flashing red - e.g. module installed as node, but with nothing connected



## Connectivity Stacking Module

- **Stacking Module and Cable**
  - **Installed into stacking slot on rear of each DeskStream in a stack**
    - **module has two mini SCSI connectors**
  - **Supplied with short, mini-SCSI cable**
  - **Top port connects to DeskStream above**
  - **Bottom port connects to DeskStream below**
  - **Unused ports do not need to be terminated**
  - **8 DeskStreams can be stacked**
  - **Stacking bus has 640Mbps data throughput**

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The stacking bus is not configurable in any way  
It uses a cell-based communications technology (similar to ATM)

The cells are 53 bytes long including an 8-byte header and 45 bytes of payload

The bus has 640Mbps of bandwidth available and each DeskStream can access up to 350Mbps.



## Connectivity

### Stacking Module - 2

- **Bottom DeskStream**
  - Automatically configures itself as Master
  - Assumes responsibility for stack management
  - TrueView sees the stack as a single icon
  - Uses Master mgmt MAC address or LAA
    - Mgmt MAC is same as base MAC address
- **Single IP address per stack**
- **Single download image,**
  - Master takes care of upgrade to all DeskStreams in the stack
  - Active download
  - Uses this microcode after reset

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Trueview displays a single icon for each stack. Opening the icon shows the individual units in the stack.



## Connectivity

### Stacking Module - 3

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- **Stacking Module cannot be hot-swapped**
  - **DeskStream unit must be powered off before installing stacking module**
  - **Cable may be connected to another DeskStream while it is powered on**
  - **Stacking becomes active on reboot of all DeskStream units in stack**

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It is important to remember that any installation or removal of modules must be done with power off - this device has no hot swappable units.

Cabling is, of course movable at any time and this includes the stacking bus cables. Removing a stacking bus cable will be detected by the Master unit and this will cause a reboot; adding a cable is not detected by the Master so a manual stack reboot will be required.



## Connectivity Stacking Module - 4

- **DeskStream Resilience**
  - **Lost power or stacking module failure**
  - **Stack will reboot**
  - **If failing unit is in the stack center, two separate stacks will form**
  - **'New' stack appears under TrueView/32 (If secondary uplink exists)**



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A DeskStream may fail in two ways: one in which the stacking bus is taken down (usually a total power failure) and another where the DeskStream fails but keeps the stack active.

In the first case the stack will divide around the failing DeskStream, resulting in two stacks each of which will be detected by Trueview if both stacks have an uplink. The Master will detect this failure and reboot (the remains of) its stack (stack 2 in the slide).

A new master will take control of the 'new' stack and start with a reboot.

If the network is using IP and a secondary uplink exists, it will be necessary to give the upper part of the defective stack an IP address if both parts are to continue working. A DHCP server will be helpful here.



## Connectivity Stacking Module - 5

- **DeskStream Resilience**
  - If stacking module remains operative
  - Stack will reboot
  - If failing unit is in the stack center, stack continues to operate
  - DeskStream will be shown as failed under TrueView/32

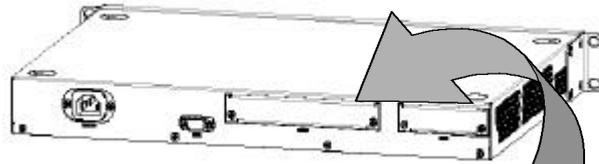


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In the second case, the Master will detect the failure and attempt to recover the failing unit by rebooting the stack. Assuming this doesn't solve the problem, Trueview will show the stack with a failed module, but the stack will continue to operate. Of course users on the failed module will be off the network.



## Uplink Connectivity



**Uplink modules are installed in the back of the unit**



**Use the icon to display the uplink ports**

**The icon will display the uplink ports on all the Deskstreams in the stack**

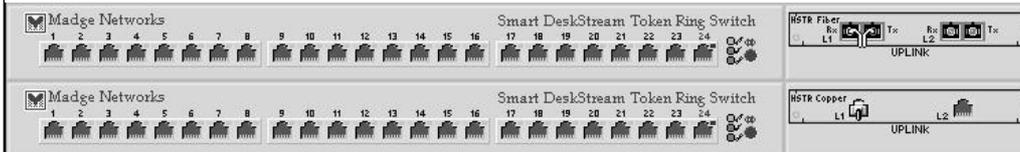
Smart DeskStream Technical Presentation 25

### Managing the Uplink Module

The uplink is a function of the stack so selecting the uplink icon will display all the uplinks in the stack.



## Uplink Connectivity



**The icon will display all the uplink ports which exist on the stack**

**Select individual ports for management**

**Link 1 is port 25 and Link 2 is port 26**

Smart DeskStream Technical Presentation 26

### Managing the Uplink Module

The uplinks are, to a large extent, just two more ports similar to port 24 in that the port type can be configured. They are numbered 25 and 26. In a stack each port is known by the DeskStream number in the stack followed by the port number e.g. 2.21 - this is the second Deskstream (counting up from the master (1)) and port 21.



## Fiber Connectivity

### TR Fiber Module - 1

- **Dual Link Fiber Connectivity**
  - Each link supports 4Mbps, 16Mbps and Full Duplex (DTR)
  - Links operate independently
  - Allows redundant links / load sharing in Fiber environments
  - Each link can be set to Master or Direct mode (Node or Concentrator mode)



The two uplink ports, although physically mounted on the same module, are in fact separate entities which will operate independently. This means that they can each be used for different functions, if necessary:

one could be an uplink to a Ringswitch, the other could have a server attached for example; they could each be connected to different Ringswitches to allow a dual path (not very resilient if the DS fails!); or one could be used to connect to another remote DeskStream while the other had a server attached ... and so on. More examples on the next slide.

This is possible because the port type can be configured.



## Fiber Connectivity

### TR Fiber Module - 2

- **Allows Fiber connection to**
  - TR Fiber adapters
  - Backbone TR switch fiber ports
  - Third party Fiber TR shared hub ports
  - TR CAU Fiber Trunk Link
    - configure for *Ring In, Ring Out* mode
  - **Other DeskStream Fiber modules**
    - In back to back mode
      - One DeskStream Link set as master, the other set as direct



Can be configured in the same way as a Ringswitch fibre port, for attachment to a CAU fibre RI/RO port



## Fiber Connectivity

### TR Fiber Module - 3

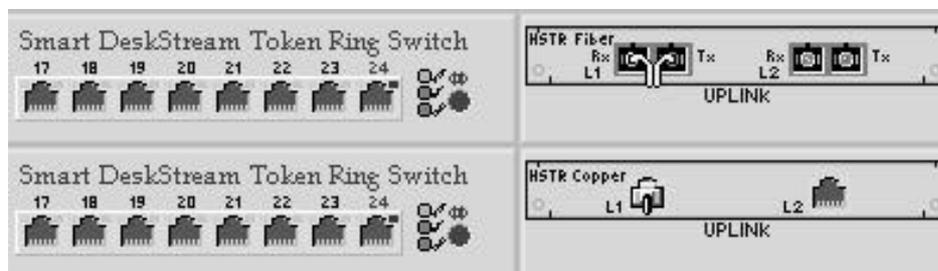
- **Fiber port Specifications**
  - Uses standard IEEE 802.5j specifications
  - Operates at wavelength 850 nm
  - Supports Multi-mode Fiber cabling
    - 62.5/125um or 50/125um acceptable
  - Distances of 2Km
  - ST connectors





## High Speed Token Ring HSTR Copper and Fiber Modules - 1

- **Dual Link HSTR Connectivity**
  - Each link supports 100Mbps Full Duplex DTR
  - Compatible with IEEE 802.5t
  - Copper module uses RJ45 connectors
  - Fiber module uses SC connectors
  - Links operate independently
  - Offer redundant links / load sharing
  - Each link can be set to Master or Slave mode



As with the Ringswitch HSTR module this only supports 100Mbps full duplex DTR and is fully compatible with IEEE 802.5t, the HSTR specification.

There are two HSTR modules:

Copper which uses RJ45 connectors and  
Fibre which uses SC connectors

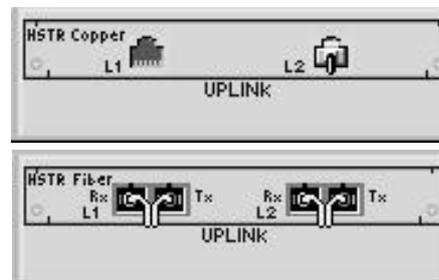
As we saw with the standard TR module, each port is independent and can be used in the same ways with other HSTR components.



## HSTR Connectivity

### HSTR Copper and Fiber Modules - 2

- **Allows HSTR connection to**
  - HSTR adapters (for servers & power users)
  - Backbone HSTR switch ports
  - Other DeskStream HSTR modules
    - In back to back mode
    - One DeskStream Link set as master, the other set as slave



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## HSTR Connectivity

### HSTR Fiber Module

- **HSTR Fiber port Specifications**
  - Uses standard IEEE 802.5t specifications
  - Operates at wavelength 1300 nm (same as FDDI)
  - Supports Multi-mode Fiber cabling
    - 62.5/125um or 50/125um acceptable
  - Distances of 2Km
  - SC connectors



Smart DeskStream Technical Presentation 32



# **Smart DeskStream Token Ring Switch**

## **Management**



## Network Management

### Smart DeskStream Manager

- Graphical, Windows-based management
- Uses Madge's TrueView/32 platform
  - 16-bit TrueView does not support DeskStream
- Easy to use
- Will integrate with other platforms
  - DeskStream Mgr for HP OpenView for HP-UX and NT
  - DeskStream Mgr for Tivoli NetView for IBM AIX

### Command Line Interface (CLI)

- Text based
- via Telnet session or Direct serial connection
- Allows access to more complex operations

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There are two major ways of managing the DeskStream:

1. Using Trueview/32
2. Using the command line interface.

There is no 16-bit Trueview device manager for DeskStream and so it can only be managed with Trueview/32 - the 32-bit version.

This is just another device manager and is used in the same way that other device managers are used in Trueview.

Trueview itself can be integrated into higher level network management software, e.g. HP OpenView and Tivoli NetView. Using one of these to access a Madge device will bring up the Trueview device manager.

The command line interface can be used via a null modem connection to the 9-pin serial interface on the back of the DeskStream, or using IP and Telnet through the normal network ports. The content is the same.



## Smart DeskStream Management Features

### Software Downloads

- **Download in active mode**
  - Download becomes active on reboot
- **Single download file for all flash and microcode files**
  - TFTP over IPX or IP
  - SNMP over IPX or IP
  - Flash memory to run diagnostics, MAC and boot sequence

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All downloads are performed via a normal network connection when the DeskStream is active. The new microcode is stored in flash memory until the next stack reset, when it is stored permanently.

There is a single binary file for all required software for the DeskStream.

The process can be managed from within Trueview when we specify TFTP over IP or IPX, or the serial port or Telnet which uses raw SNMP commands (IP only of course over Telnet).

Using the serial port or Telnet to manage the process is simple over IP, we just need to specify the IP address of the machine hosting the binary file, and the path to the file. It is a little more complex over IPX since we will need to specify the Network id (8 hex digits), the node id (MAC address - 12 hex digits) and the socket id (4 hex digits).

E.g.                   00000002 (Network id )  
                          0000F63D1836 (Node id)  
                          5400 (Socket id)

Use the Trueview *Tools, Services, Configuration* to discover these values.



## Smart DeskStream Manager

### Advanced Functionality

#### Easy to configure options

- Up to 5 write and read passwords
- Dynamic table of port configurations
- Copy bit on transparent frame option

#### Simplified support

- Menu icon to view all microcode versions
- Configuration downloads and uploads
- Switch status report

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We can set up to five write and read passwords to give several people different levels of management access to the DeskStream.

The Dynamic table or port configurations allows us to change any one of the configurable port parameters on one or more ports at one time. The contents of this table can also be saved to file, clipboard or to a printer for archiving. When saving this table wait until it has finished its dynamic restore.

Bridges and switches sometimes have a problem with the setting of the Address Recognised/ Frame Copied bits when using transparent bridging. This can be manually configured on the DeskStream.

A Trueview icon will display the hard and software versions; this information can be saved to a file, clipboard or to a printer. Dump and Configuration data is also noted in this table which can be uploaded and subsequently, if necessary, downloaded back to the DeskStream.

Opening the I-field icon will show a status report for the DeskStream; if there is a problem a *Details* button will give more information.



## Smart DeskStream Manager Command Line Interface

### Telnet and serial interface menu is easy:

#### DeskStream Terminal Configuration

1. General
2. Versions
3. IP
4. Port
5. Port Group
6. Spanning Tree
7. Bridge
8. Download
9. Debug
10. Quit

Enter selection number:

Smart DeskStream Technical Presentation 37

The CLI is divided into a number of sections, each of which is divided further. Each will have some *Show* and *Set* commands, possibly function *Enable* and *Disable*.

- |                  |   |
|------------------|---|
| 1. General       | system values<br>system health<br>I-field values (name, contact, location)<br>set passwords               |
| 2. Versions      | version numbers and build time  |
| 3. IP            | IP values, set address, subnet, gateway<br>enable BOOTP, DHCP, RARP                                       |
| 4. Port          | Show/configure various port parameters on a per port basis  |
| 5. Port Group    | Show/configure port group parameters  |
| 6. Bridge        | Show/set bridge no., hop limit, SR or SRT   |
| 7. Spanning Tree | Show/set spanning tree protocol parameters  |
| 8. Download      | Set IP/IPX address of binary file host<br>Start IP or IPX download  |
| 9. Debug         | Set address for uploading file, dump or configuration data<br>Show last reset, last dump, last saved data |
| 10. Quit         | Guess!  |



## Smart DeskStream Diagnostic Features

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### Diagnostic Downloads

- Self-tests run on every reboot
- Output is sent over serial port as it runs
- On failing,
  - The test will halt
  - The Status LEDs will flash to signify an error
  - The failing test message will be re-sent to the serial port every 15 seconds
  - A terminal can then be connected to see the error
- Output can be provided to Madge Support for problem diagnosis
- Allows simple and quick diagnosis of problems

Smart DeskStream Technical Presentation 38



# **Smart DeskStream Token Ring Switch**

## **Source Route Switching**



## Smart DeskStream Objectives

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**At the end of this session you will be able to:**

- **Explain Source Route Switching, including**
  - Concentrator Relay Function
  - Bridge Relay Function
- **Demonstrate IBM & IEEE Spanning Tree support**
- **Use the built-in Diagnostics**



## Source Route Switching

- **What is Source Route Switching ?**
  - Industry term for using switching in the workgroup
  - Refers to IEEE 802.5 Annex K specification
  - Supports Transparent and Source Route traffic
- **How does it work ?**
  - Switch behaves like a transparent switch
    - Matches the MAC address and route descriptors to ports
  - Source Route information is preserved

Smart DeskStream Technical Presentation 41



## Source Route Switching 'Annex K'

- **Components of Annex K ?**
  - **Concentrator Relay Function (CRF)**
    - Handles switching process
    - All ports access the network using the same ring number (source routing)
    - Includes all ports (by default) within a stack of DeskStreams
  - **Bridge Relay Function (BRF)**
    - Allows bridging between CRF and ports on different ring numbers
    - Equivalent to an IEEE SRT switch

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The CRF manages all the basic ports including a 'virtual' port which gives a link to the BRF interface and any ports which have been transferred to that interface.

Ports within the CRF all use the same ring number (although they are not in a ring - this is a switched environment). This allows an SR frame (in an SR network) to find the correct DeskStream stack; the CRF will sort out, from its Address/Descriptor table, which port to pass the frame to.

The BRF allows us to take some ports out of the CRF and assign a different ring number to each. The BRF manages the switching between these ports and - via the CRF - to the basic ports.



## Source Route Switching Frame Forwarding using CRF

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- **DeskStream behaves as a transparent bridge**
  - **It learns the MAC and RIF information in passing frames, and builds up an address table**
    - **Also known as Active Learning**
  - **As frames arrive, the next hop or destination MAC address is looked up in the table to determine which port to forward the frame**
    - **If the destination MAC address or route descriptor is not listed against a port the DeskStream forwards the frame to all ports**
  - **Up to 2048 entries of MAC or route descriptor in each DeskStream**

Smart DeskStream Technical Presentation 43



# Source Route Switching

## Introducing multiple uplinks - 1

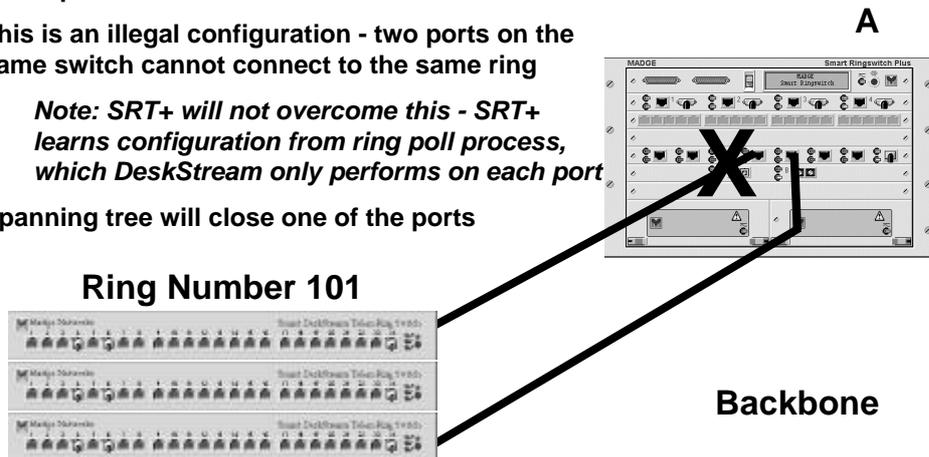
### ■ Resilient links

Dual uplinks to the same backbone switch

This is an illegal configuration - two ports on the same switch cannot connect to the same ring

*Note: SRT+ will not overcome this - SRT+ learns configuration from ring poll process, which DeskStream only performs on each port*

Spanning tree will close one of the ports



Smart DeskStream Technical Presentation 44

Duplicate links to the same Ringswitch will usually result in a bridging error - bridging a ring to itself makes no sense - and spanning tree will close one of the ports



## Source Route Switching

### Introducing multiple uplinks - 2

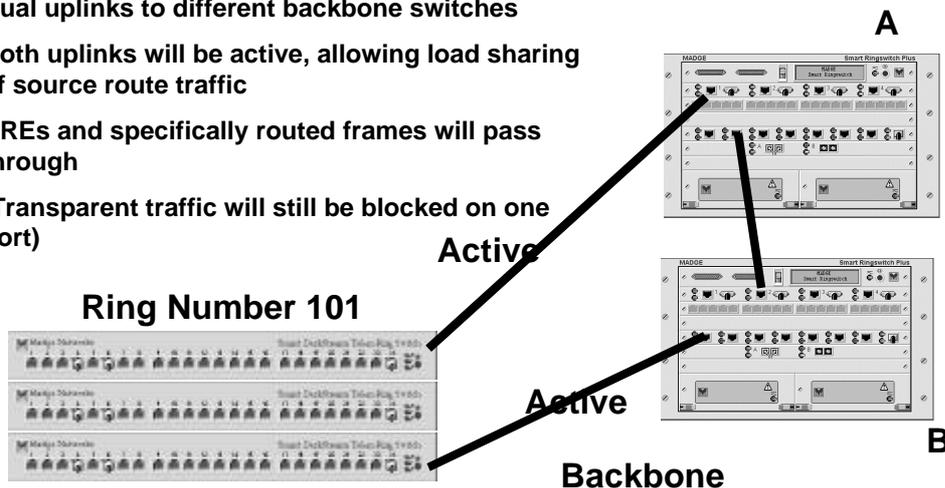
#### ■ Load sharing connectivity

Dual uplinks to different backbone switches

Both uplinks will be active, allowing load sharing of source route traffic

AREs and specifically routed frames will pass through

(Transparent traffic will still be blocked on one port)



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Dual connection to two Ringswitches, each with its own bridge number, and both ports having the same ring number assigned, is a valid and normal resilient operation.

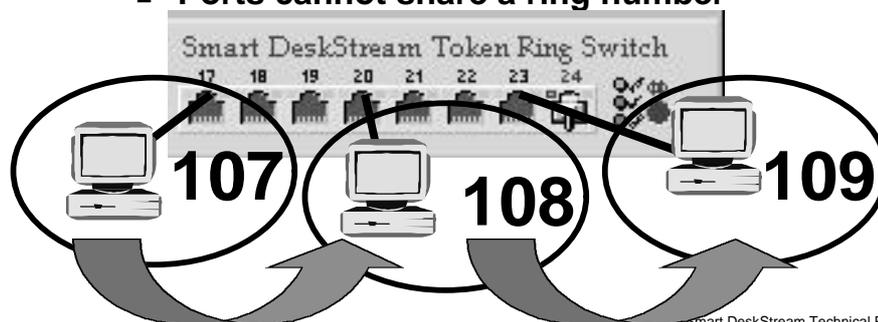
On a Source Routed network one of the Ringswitch ports will be *designated*, the other *standby*. Standby ports will not pass Spanning Tree Explorer frames (sometimes called Single Route Explorers), but will pass All Routes Explorers and Specifically Routed frames.

In a Transparently bridged network one port will be *forwarding*, the other *blocking*. Blocking ports allow no frames to pass.



## Source Route Switching Bridging using BRF

- **What is the Bridge Relay Function?**
  - Provides SRT bridging between SR ring numbers on different ports
  - Allows a different ring number to be set on each port
  - Ports cannot share a ring number



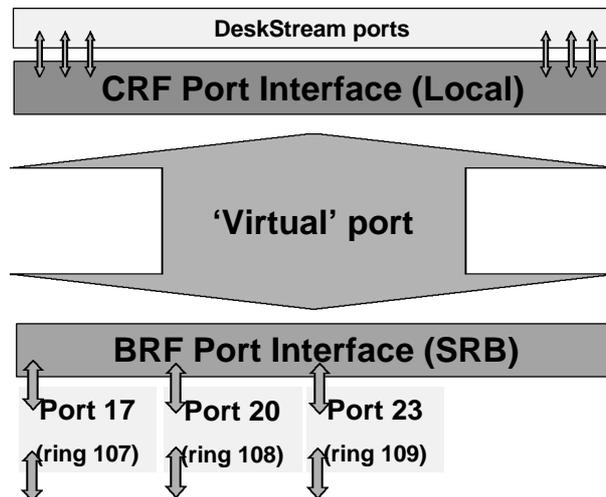
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The BRF allows us to set up ports outside the CRF. These have individual ring numbers which cannot be shared. The BRF allows these ports to communicate with each other and, through the CRF, with the ports using the shared ring number.



## Source Route Switching Bridging using BRF

### ■ What is the Bridge Relay Function?



Smart DeskStream Technical Presentation 47

The CRF manages switched communication between its ports.

The BRF is only available on the Master DeskStream - the bottom one in a stack - and manages switched communications for the BRF ports.

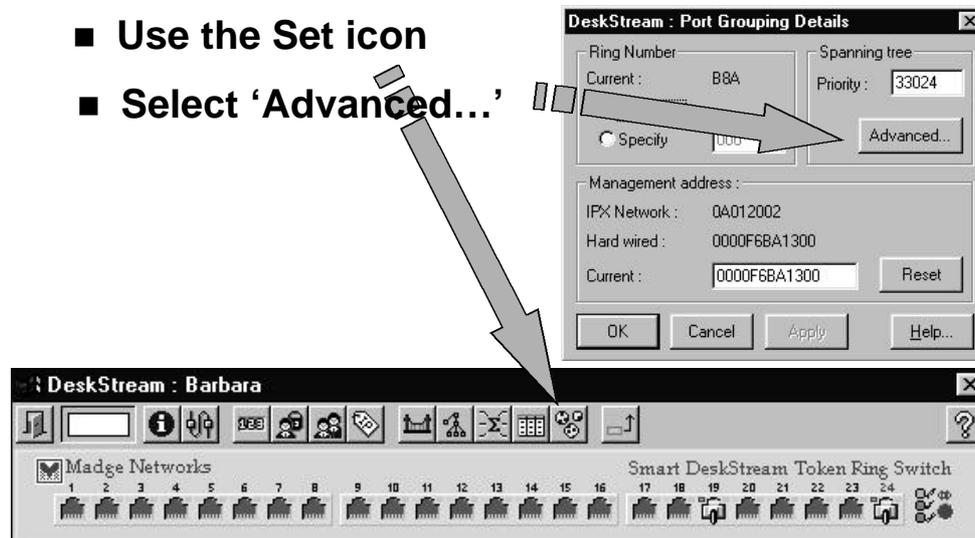
By default all ports in a DeskStream stack are in the CRF, but we can enable the BRF interface on any or all of the Master DeskStream ports including the uplink modules.

Communication between the CRF interface - known as the Local Interface - and the BRF interface - known as the Source Route Bridging (SRB) Interface - is via the 'virtual' port.



## Source Route Switching Setting up the BRF interfaces

- Use the Set icon
- Select 'Advanced...'



Smart DeskStream Technical Presentation 48

Setting up the BRF is a global function using the indicated icon.

The port grouping dialogue box specifies the CRF parameters, but the Advanced button takes us to the internal interfaces - local and SRB.



## Source Route Switching Setting up the BRF interfaces

**Local IF parameters**

**SRB IF parameters**

Smart DeskStream Technical Presentation 49

The main use of the two parts of this dialogue box is to vary the path cost. These two interfaces are within the DeskStream and for optimal network management we don't want these to be standby or blocking bridges. The local interface, by default will have a very low path cost (2) and so should always be designated or forwarding. The SRB interface is currently defaulted to auto path cost and so will get a value based on the ring speed divided into 1000 (62 for 16Mbps, 10 for 100Mbps). It might be sensible to lower this manually.

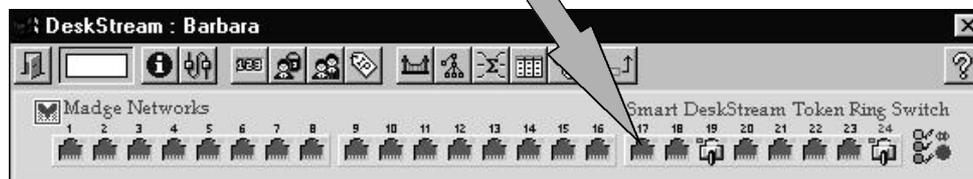


## Source Route Switching Setting up BRF on a port

- Select a port



- Select SR bridging



Smart DeskStream Technical Presentation 50

Once the interfaces are set up, enabling SRB on individual ports on the Master DeskStream is simple. The SR Bridging entry in the menu will only appear on ports on the Master DeskStream. Select this entry.



## Source Route Switching

### Setting up BRF on a port - 2

- Enable SRB
- Auto learn or Specify ring number



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The resulting dialogue box is similar to that for the CRF except that we can enable Source Route Bridging and there is no *Advanced* button.

We can choose to enter a ring number or let the device find it for itself; we can set the maximum hop count - this will vary depending on whether we are using the IBM spanning tree specification (7) or the IEEE (13).

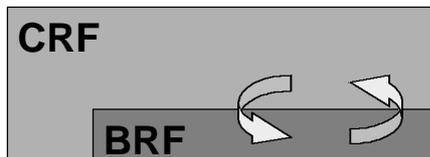
We can also set an LAA if we want to.



## Source Route Switching

### Combining CRF and BRF functions

- CRF is operational on all ports in stack by default
  - CRF will attempt to learn ring number
  - the CRF ring number can be manually configured
- BRF will only function on master DeskStream
  - only ports on master DeskStream are supported on BRF
  - Each port can be designated as a *BRF port*, including option module ports
  - Each BRF port has its own ring number
  - BRF ports can auto-detect ring number
  - Internal “virtual” port links between the CRF and BRF



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#### Summary

CRF will attempt to learn the ring number from the RIF in passing frames as will the BRF.



## Source Route Switching Introducing multiple uplinks - 3

### ■ Load sharing, resilient connectivity

Dual uplinks to the same backbone switch

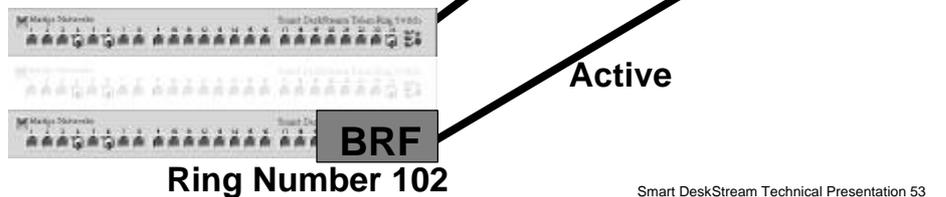
A

This is an illegal configuration - two ports on the same switch cannot connect to the same ring

Use BRF to set one of the ports to a different ring number

This is a legal configuration - both uplinks will be active

If middle DeskStream fails, both DeskStreams retain backbone connectivity



What do we need the BRF for?

One use is in resilient networks. The DeskStream replaces the shared medium hubs which are often connected to two backbone switches to ensure a connection.

As we have seen, connecting two CRF ports to one Ringswitch is an illegal configuration and will fail. If we need to connect this way - perhaps to ensure maximum connectivity for a DeskStream stack if one fails catastrophically - then the BRF with a different ring number makes this an allowable configuration.

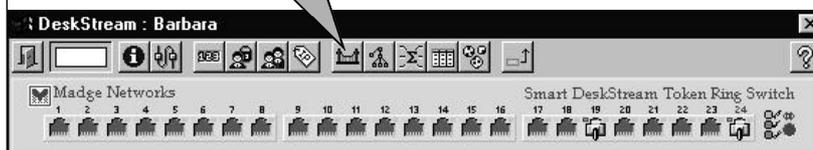
We will need to manage the path costs to ensure that standby (SR) or blocking (Transparent) ports are in the Ringswitch.



## Source Route Switching

### Introducing multiple uplinks - 3

- Setting Spanning Tree mode
- Select icon
- Set IEEE or IBM
- Set SRT or SR only



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Selecting the bridge icon brings up the Bridging Information dialogue box.

In this we can set the Bridge Number (in a resilient network) and the global hop count limit - this has a maximum of 7 for the IBM spanning tree option and 13 for IEEE 802.1d.

We can choose the spanning tree option we want to use. Don't forget that this must be consistent over all relevant devices on the network.

We can also choose whether the switch will support SRT or SR only. Selecting SR only will change the spanning tree mode to IBM SR.



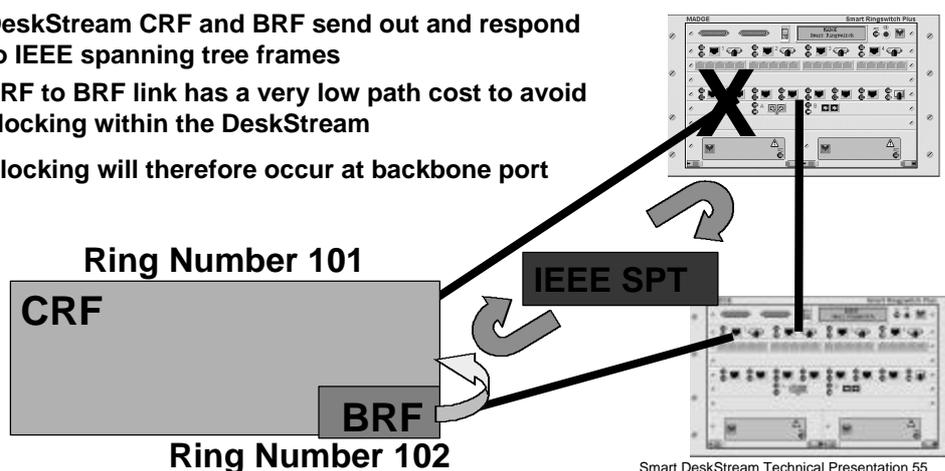
## Spanning Tree IEEE Spanning Tree Support

- DeskStream supports IEEE
  - DeskStream participates in negotiation

DeskStream CRF and BRF send out and respond to IEEE spanning tree frames

CRF to BRF link has a very low path cost to avoid blocking within the DeskStream

Blocking will therefore occur at backbone port



In a more complex resilient network the CRF/BRF takes part in the bridging conversations since it is a bridge. The responses to Spanning Tree management frames is completely normal and so will it will depend on path cost, ring number or MAC address as to which ports are designated or standby (forwarding or blocking).

Note on internal blocking:

This is not a problem if the only BRF port is an uplink, but ALL BRF ports will use this interface, so if it is blocking this may impact other connections - dual attached servers for instance? If the BRF or Local interface blocks it may result in the majority of traffic taking a longer, less efficient route.

For that reason, it is important that all blocking/standby ports are external to the DeskStream i.e. in a Ringswitch.



## Spanning Tree IBM Spanning Tree Support

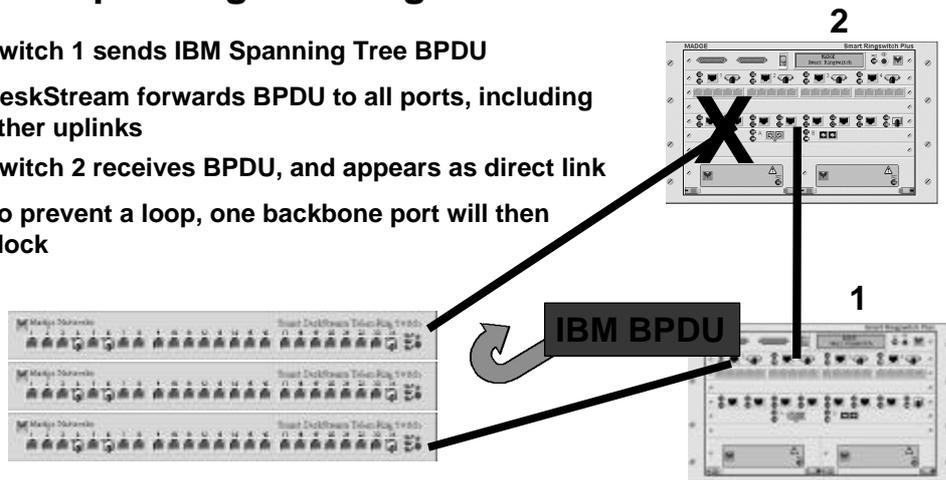
- **DeskStream DOES NOT participate in IBM Spanning Tree negotiation**

Switch 1 sends IBM Spanning Tree BPDUs

DeskStream forwards BPDUs to all ports, including other uplinks

Switch 2 receives BPDUs, and appears as direct link

To prevent a loop, one backbone port will then block



Smart DeskStream Technical Presentation 56

A DeskStream stack with only CRF ports doesn't take part in any bridging conversations - it acts in the same that a CAU would.



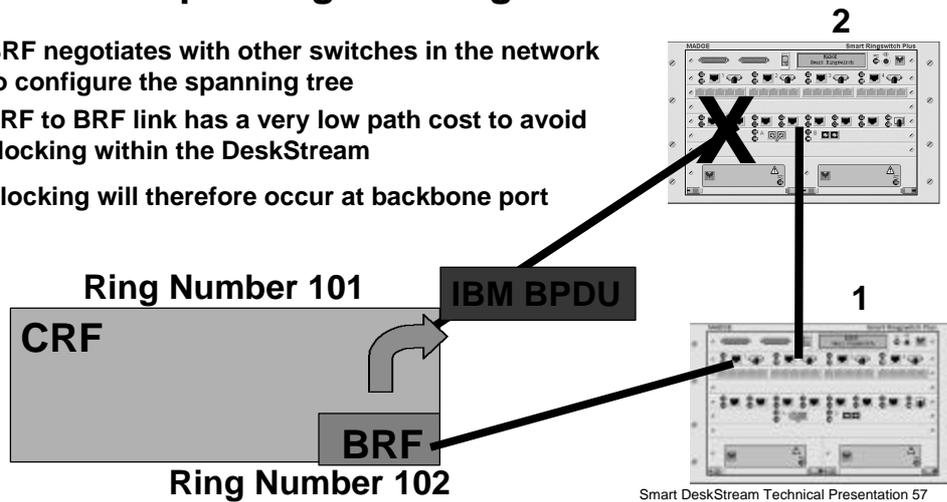
## Spanning Tree IBM Spanning Tree Support - 2

- BRF can be configured to participate in IBM Spanning Tree negotiation

BRF negotiates with other switches in the network to configure the spanning tree

CRF to BRF link has a very low path cost to avoid blocking within the DeskStream

Blocking will therefore occur at backbone port



As we saw in an earlier slide.



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