



# SwitchStar™ Reference Design Using the IDT77V400 Switching Memory and IDT77V500 Switch Controller

**IDT77950**

## Features

- ◆ Complete ATM switch with up to eight ports at 155Mbps each (1.24Gbps non-blocking aggregate bandwidth)
- ◆ Intended for Engineering/Lab use to evaluate and perform design/software development for the IDT77V400 and IDT77V500
- ◆ Call setup function and signaling performed by external PC connected to port 7.
- ◆ Software (<http://www.idt.com/products/pages/ATM-77950.html>)
  - IDT SwitchBIOS to configure and initialize switch
  - SARWIN II
- ◆ Basic configuration includes three IDT77955 line cards to equip two transmit/receive ports plus the control/signalling port
- ◆ Supports features of the IDT77V400 and IDT77V500 SwitchStar™ products
- ◆ IDT77955 Line Cards available for additional switch ports
- ◆ Can be used with ATM traffic generators or individual transmit/receive PCs
- ◆ Utilizes IDT77V500 Switch Manager, IDT77010 DPI-to-UTOPIA Translation Device, and IDT77155 PHY

## Description

The IDT77950 is an ATM Reference Design based on IDT's innovative SwitchStar products, the IDT77V400 Switching Memory and the IDT77V500 Switch Controller. The Switch is made up of two separate board components: the 7M950 motherboard, which contains the Switching Fabric function based on IDT's Switching Memory and Switch Controller, and an individual IDT77955 OC-3 line card for each individual transmit receive port.

The 1.2 Gbps ATM switch has eight receive and eight transmit ports. The Switching Fabric, made up of the IDT77V400 and IDT77V500 SwitchStar products, resides on the motherboard. Each individual port resides on a line card which is interfaced to the motherboard via a Line Card PCI connector. Up to eight line cards can be connected to the motherboard, with each line card running at 155 Mbps.

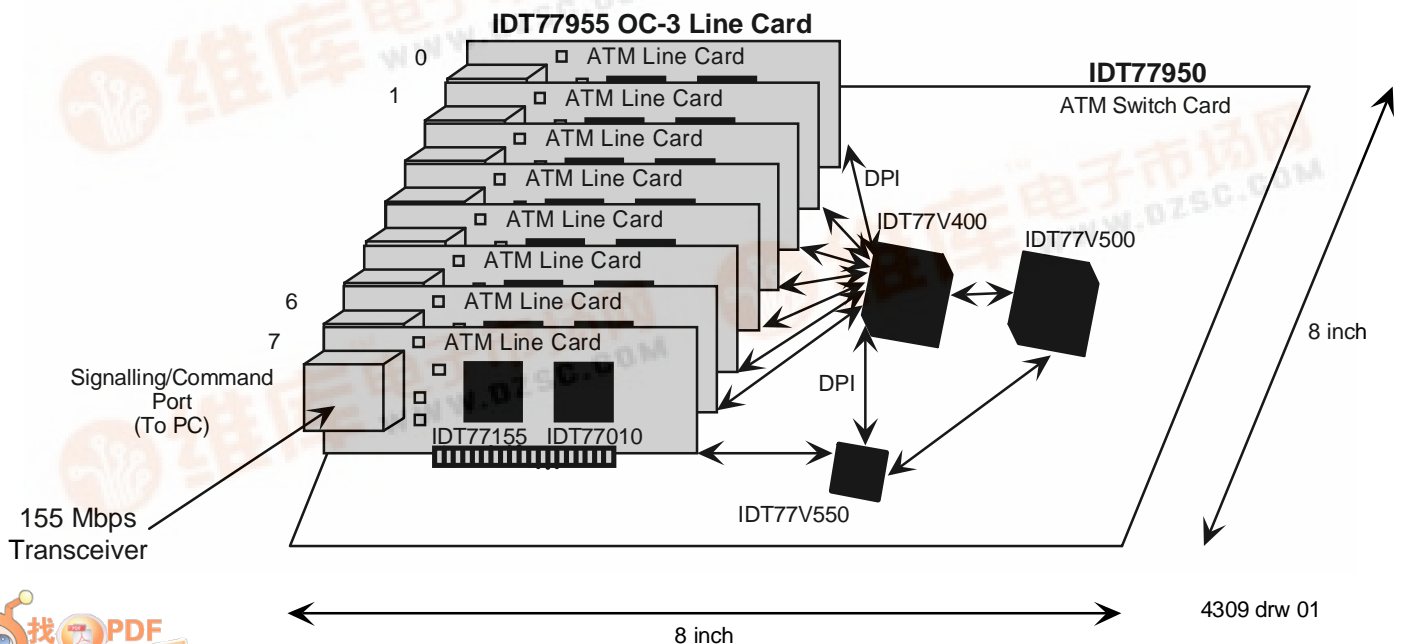
One of the line cards (Port 7) is used for communicating with a remote PC to configure, read status and perform Signalling, PNNI and OAM cell handling for the switch. All the necessary software functions are performed by the remote PC.

## Functional Description

### Motherboard Functionality

The motherboard consists primarily of three devices: the IDT77V400 Switching Memory, the IDT77V500 Switch Controller, and the

## IDT77950 Board Layout



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IDT77V550. Full duplex 4-bit signals are passed from the motherboard to the line cards.

The IDT77V400 Switching Memory has eight ports that can either input and eight output ports and it receives cells via the 4-bit DPI bus. Incoming cells may be received on any of the up to eight input ports simultaneously, the stored inside the IDT77V400. Up to 1K ATM cells per input port (up to 8K ATM cells in a fully configured IDT77950) can be stored in the IDT77V400, and upon transmission the cells can be sent out of any of the up to eight output ports. Each one of the receive and transmit lines has a separate clock, which can be run at SCLK 40 MHz.

The IDT77V500 Switch Controller manages all of the cell traffic that passes through the IDT77V400, directing the cells and determining service priority via ATM Quality of Service parameters. The Switching Memory is polled by the IDT77V500 for the arrival of a new cell. When a complete new cell is identified on a particular input port, the IDT77V500 reads the cell header, makes switching and priority decisions, and then commands the IDT77V400 to store the cell until the time to transmit that particular cell arrives. The IDT77V500 then issues a command to move the cell to a particular port and transmit. Decisions made by the IDT77V500 are based on a set of parameters setup in a table via an external Call Setup Manager CPU.

Additional information on the IDT77V400 Switching Memory and the IDT77V500 Switch Controller are available in the data sheets for the respective products.

The IDT77V500 is initialized, configured and updated via an 8-bit management port. The IDT77V550 Switch Manager is used on the IDT77950 to interface this 8-bit IDT77V500 management port to the remote PC via Port 7. This Switch Manager intercepts received cells from Line Card 7 and copies the cells to the IDT77V500. These cells are also forwarded to Port 7 of the IDT77V400. The copied cells are identified using a unique cell header VPI = 00 hex and VCI = 001e hex. This is a VCI number only used by the IDT77V550. The commands to be written to the IDT77V500 via the 8-bit manager port are contained in the payload of these cells.

Similarly, the internal registers of the IDT77V500 are read by the IDT77V550 and an ATM cell is constructed with VPI = 00 hex and VCI = 0020 hex. This is a unique VCI address used for communication between the IDT77V500 and the remote PC. Cells generated by the IDT77V550 are inserted in the DPI cell stream going from the IDT77V400 to the line card 7. In this way the End Station connected to the line card 7 controls and monitors the IDT77V500 internal registers. The IDT77550 uses a 40MHz clock for the IDT77V500 Manager port and the DPI clock.

### Line Card Functionality

The function of the line card is to interface with the IDT77V400 Switching Memory DPI bus on one side and a 155Mbps fiber cable on the other. There are three primary components on each line card: on OC-3 optical line driver, an IDT77155 OC-3 PHY device or equivalent to the interface the optical line driver to the IDT77010, and a IDT77010 DPI-to-UTOPIA Translation Device line card to interface the UTOPIA 1 PHY to the 4-bit DPI bus of the IDT77V400. The IDT77010 is also used to in-band signalling to configure, control, and monitor the IDT77155 PHY device.

Power, clock, and the Reset signal are picked up from the motherboard connector. Three LED's are used on each line card to indicate cells being transmitted, cells being received, and a carrier detect indicator.

The IDT77010 interfaces the UTOPIA 1 bus to the 4-bit DPI bus and controls and monitors the PHY registers using an 8-bit multiplexed bus. A control cell is received and the control command is executed. Similarly the read control cell status is loaded into a transmit control cell and transmitted to the remote PC.

### Equipment Needed

The following items are required to run the IDT77V950 ATM Switch-Star Reference Design.

1. Standard PC power supply with both 5V and 12V outputs via a standard 4-pin connector. Plugs into the motherboard and supplies the power for the motherboard and the line cards.
2. One PC with 7M924 or 7M944 card for Call Setup Manager activity through Port 7. Must be a Pentium class machine with PCI Bus and Windows 95.
3. SC-SC Duplex Fiber Optical Cables. One required for each line card installed in the motherboard.
4. Source for ATM Cell generation and reception, such as an ATM Analyzer or PC's with the appropriate software.

### Software

Two separate software tools are provided to fully utilize the IDT77950: IDT SwitchBIOS and SARWIN II NIC driver.

IDT SwitchBIOS is a windows driven program that allows the user to configure, initialize, and program the IDT77V400 and the IDT77V500. It offers the opportunity to do software development work on SwitchStar based switch designs, as well as to analyze switch performance in various configurations and modes. There is also a script feature which allows the programmer to set up scripts of repetitive or commonly used sequences (such as initialization or configuration) that need to be run on the IDT77950.

The SARWIN II NIC driver must be installed on the PC(s) prior to running SwitchBIOS. Please refer to the separate IDT SwitchBIOS documentation for further details.

### Switch Identification

The IDT77950 ATM switch is identified to the switching and signaling software by an 8-bit switch identification which is determined via an eight position signal pole signal throw DIP switch on the board. The IDT77V550 reads this 8-bit information and sends it to the remote software.

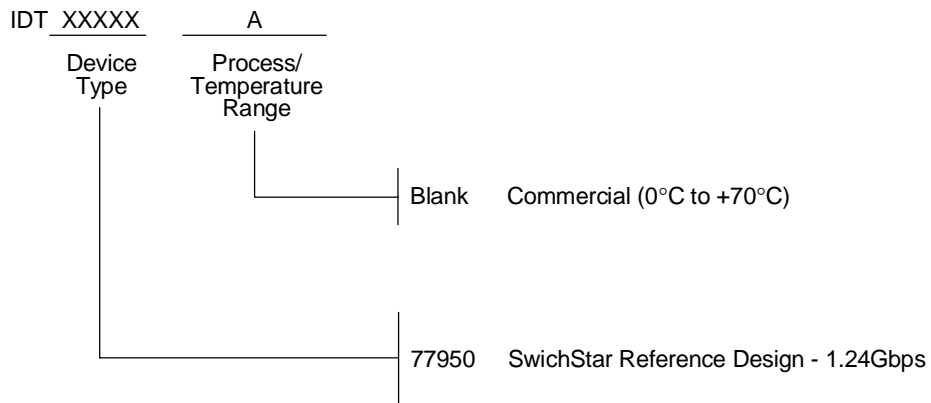
Switch Toggle	1	2	3	4	5	6	7	8
Position	ON	OFF	OFF	OFF	OFF	ON	ON	ON

This identification must match the information on the SwitchBIOS software. The Switch identification DIP Switch on the IDT77950 should be set to the following positions for SwitchBIOS released version 2.0 and 3.0:

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This DIP Switch setting corresponds to a Switch Manager Control VCI of 0x1E. Please verify that the Switch Manager Control VCI in SwitchBIOS is set to this value before attempting to operate the Switch. If it does not match (the typical default value is 0x1F) use the procedure on page 39 of IDT SwitchBIOS 3.0 Specification to modify the Switch Manager Control VCI to 0x1E. This edit must be made after every power on/off operation with the switch to insure the proper Switch Manager Control VCI.

## Ordering Information



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## Revision History

December 1997: Initial publication.

April 3, 2001: Changed AdvanceNet System NICStAR to SARWIN II NIC.



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