Functional description (FN)

1.0 Issue/change control

Table 1

Issue	Date	Reason	Change	Author
	Sept. 28, 93	Initial release for internal review		Ihab Mahna Paul hung
	Dec. 21,93	Release for external review (Harvard)		Ihab Mahna
		Update		
		Update		

2.0 Activity synopsis

This activity provides software communication interfaces for the multi-processor environment of the CreditNet switch. These communication interfaces permit the following major functions:

- Microprocessor software download.
- Switch and hardware configuration (including FLEX chip configuration data) download.
- Messaging between microprocessors.
- Messaging between microprocessor and switch workstation.

3.0 Activity description

3.1 Introduction

The CreditNet switch is an Asynchronous Transfer Mode (ATM) based Gigabit Local Area Network (LAN) switch which is capable of supporting link-by-link flow control on a per virtual circuit (VC) basis. It basically comprises the following major processing entities:

1. The Switch Workstation - It is a UNIX based workstation responsible for the switch User Interface (UI) and file storage.

2. MasterCard Processor (MCP)- It has an Intel i960 microprocessor and runs the VxWorks real-time operating system software. It is essentially the switch controller and is responsible for the following:

- Master control of up to 15 PortCards.
- System initialization.
- MasterCard diagnostics.
- Software and hardware configuration download.
- VC management and maintenance.
- Network interface and management.

3. PortCard Controller (PCC) - It has an Intel i960 microprocessor and may run on a mini-kernel of the VxWorks operating system software. It is responsible for the following:

- PortCard initialization.
- PortCard diagnostics.
- PortCard status monitoring.
- Software filtering.

4. Scheduler - It has an i960 microprocessor and is mainly responsible for VC group scheduling.

Figure 1 "Physical Communication Interface Between Switch components" on page 7 illustrates that the switch workstation interfaces with the MCP through Ethernet, whereas MCP and PCC, and PCC and Scheduler are interfaced with each other through Dual-Port memories(DP). This activity provides functional and design descriptions for the software required to provide the following inter-processor communication interfaces:

- MCP <-> Switch Workstation.
- MCP <-> PCC.
- PCC <-> Scheduler.

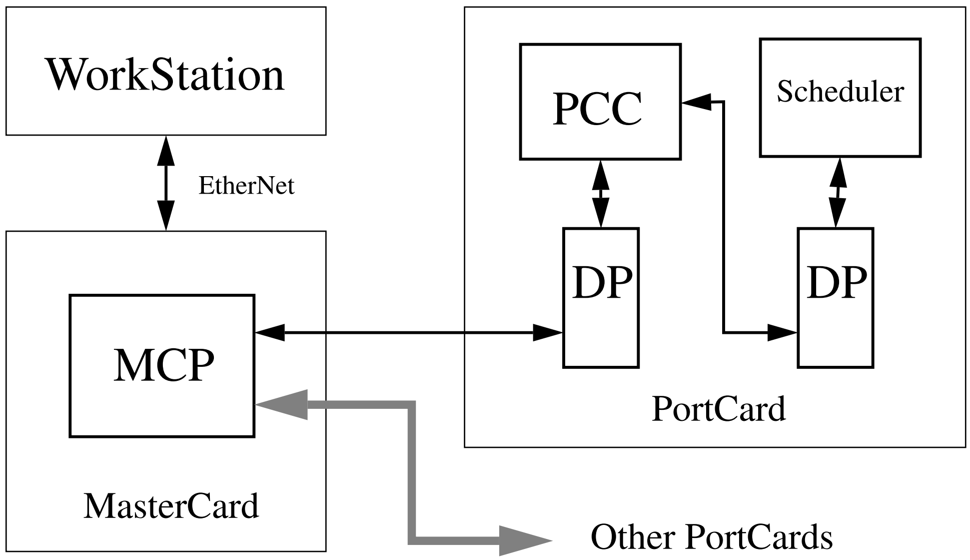

Figure 1 Physical Communication Interface Between Switch components

3.2 Functional specification

3.2.1 MCP <-> Switch Workstation Communication Interface

The Switch Workstation and MCP are connected through Ethernet. The functional attributes of the communication interface between the Switch Workstation (WS) and MCP are as follows:

1. The Switch WS can serve more than one 'client' MCP (i.e. more than one CreditNet switch).

2. The IP address of the Switch WS is predefined in the MCP bootstrap code.

3. The communication link between the Switch WS and MCP is established during bootstrap of MCP.

4. The Software loads and files are transferred from predefined directories in the Switch WS to MCP.

5. Data, logs, or messages from MCP are put to their corresponding files and directories in the Switch WS.

6. Local logs are created upon change of local performance status of the Switch WS and MCP communication interface:

7. Reporting of the Communication Interface performance status includes:

- Network down.
- Idle.
- Transmitting.
- Re-transmitting and a quantifier indicating n-th re-transmission.

8. In the case of the Switch WS, logs are stored in file(s) specifically for communication status with a given MCP.

9. In the case of MCP, logs for communication status are stored in a FIFO (First-in-First-out) or circular buffer.

10. Users can perform read, write, bit set/clear, monitor add/delete request, operations on the PCC through the MCP from the User Interface (UI). See the following sections for details on the PCC memory access operations.

3.2.2 MCP <-> PCC Communication Interface

MCP communicates with up to 15 PCs. Each PCC has a 16 kByte (DP) through which the PCC communicates with the MCP. Following are the functional attributes for the MCP <-> PCC communication interface software:

3.2.2.1 MCP -> PCC.

1. MCP has access to all memory mapped locations on the PC.

2. MCP has the following types of memory access (or message types) to the PC:

- READ REQUEST - permits read of more than one byte of data starting from a user specified memory location on the PC.
- READ RESPONSE - in response to the READ message from PC, data bytes requested are sent back.
- WRITE - permits writing of more than one byte of data starting from a user specified memory location on the PC.
- BIT SET/CLEAR - permits bit set/clear on more than one byte of data starting from a user specified memory location on the PC.
- AUTONOMOUS - permits invocation of a user specific task on the PCC from the MCP.
- MONITOR ADD/DELETE - permits contents of more than one memory location on the PC to be periodically monitored and put at user specified locations within a pre-determined block of (DP) memory. The memory locations at which data to be monitored read does not need to be consecutive locations. the application can delete this monitor if it is no longer needed.

3. MCP can download software, tables, and hardware configurations (including FLEX chip configuration data) to their corresponding memory mapped locations on the PC.

4. Both high and low priority messages from MCP to PCC can be accommodated without blocking each other. That is the high priority message will not overwrite the low priority message, and the low priority message will not block the high priority message.

5. All messages are checksum protected.

6. Message will be sent again if there is no positive acknowledgment from PCC on the previous message.

3.2.2.2 PCC -> MCP

The requirements of the Communication Interface from PCC to MCP is similar to section 3.2.2.1 on page 8 except that there is no need to download software from the PCC to the MCP.

3.2.3 PCC <-> Scheduler Communication Interface

TBD.

3.3 Operations

.N/A

3.3.1 System initiated actions

N/A

3.3.2 User initiated actions

N/A

3.4 Application interfaces

N/A

3.5 Restrictions/limitations

N/A

4.0 Optionally

N/A

5.0 Activity impact

N/A

5.1 Associated activities

N/A

6.0 Future enhancements

N/A

7.0 Glossary of definitions & abbreviations

ATM	Asynchronous Transfer Mode.
DP	Dual Port Memory.
FIFO	First In First Out.
IP	Internet Protocol.
LAN	Local Area Network.
MCP	Master Card Processor.
PCC	Port Card Controller.
UI	User Interface
VC	Virtual Circuit.
WS	Switch Workstation.

8.0 References