

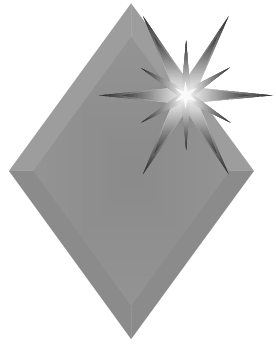
IEEE 1394 Printing Protocol

Seiko Epson Corporation

December 6, 1996

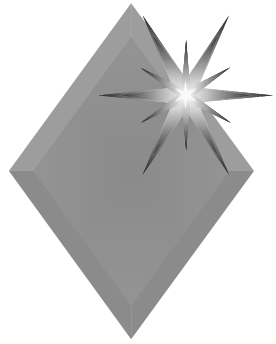
EPSON Software Development Center

EPSON Research Center



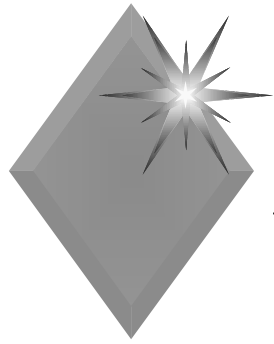
Objective

- ◆ Establish IEEE-1394 Printer Class definition which provides
 - ◆ Seamless integration
 - ◆ Plug and play functionality
 - ◆ Utilizes existing software investments
 - ◆ Addresses new opportunities



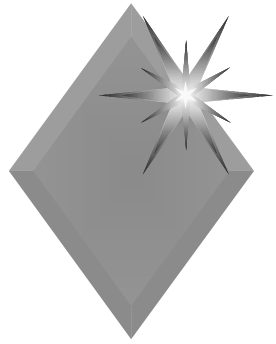
Customer Focused

- ◆ Customer wants high quality, ease of use, “enjoyable experience”
 - ◆ Plug in the device and it works!
 - ◆ Plug and Play is a good example (if all the pieces are there.)

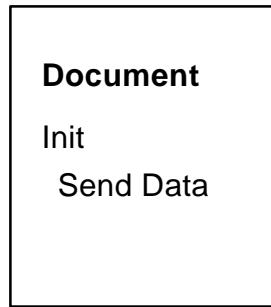


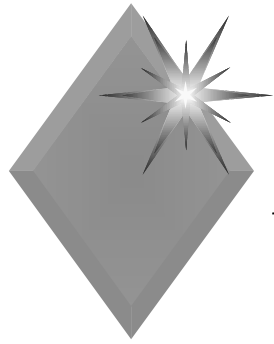
Provide the Right Solution

- ◆ Define a Spec which works across:
 - ◆ Platforms: Consumer, Office, PC, Server
 - ◆ Technologies: Impact, Inkjet, Laser, Dye-sub, Thermal....
 - ◆ Streams: PostScript, PCL, ESC/P, Raw...



Good Old Days





Bidirectional Communications



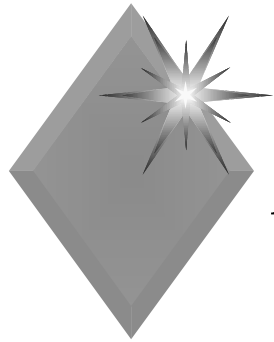
Channels

Document

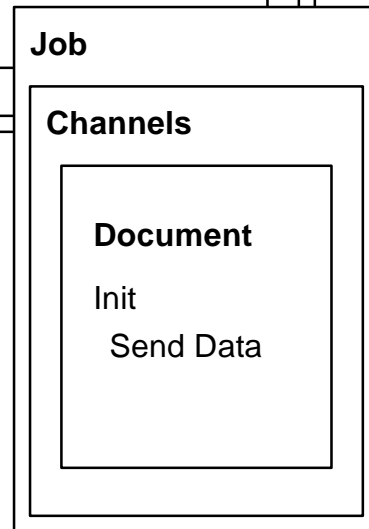
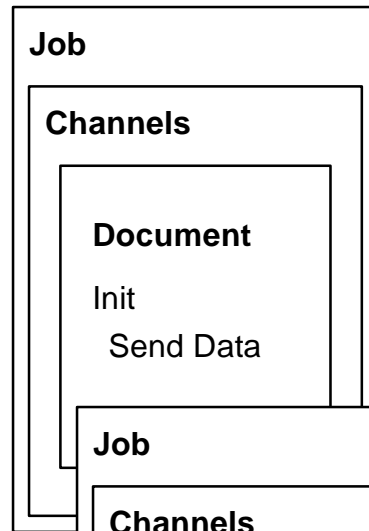
Init

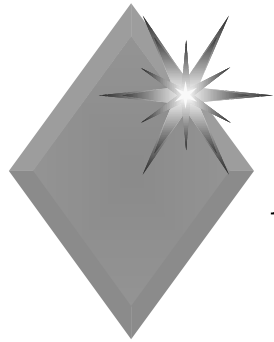
Send Data



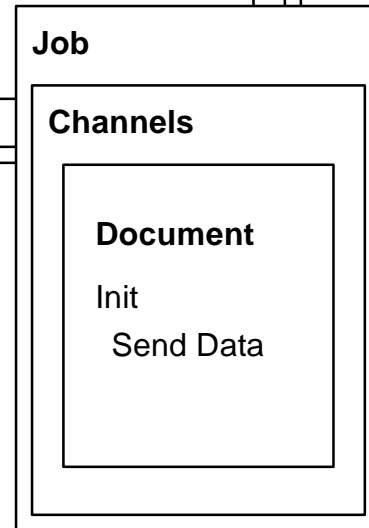
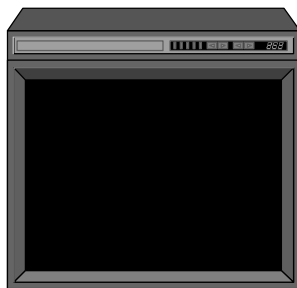
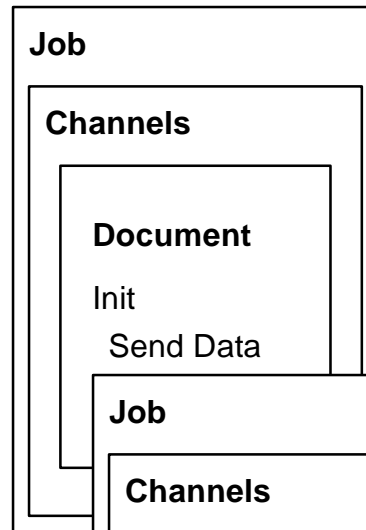


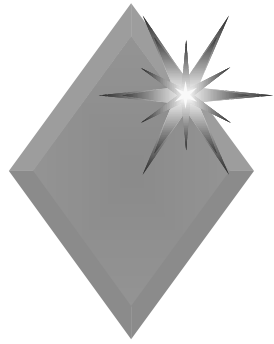
Multiple Users





New Uses

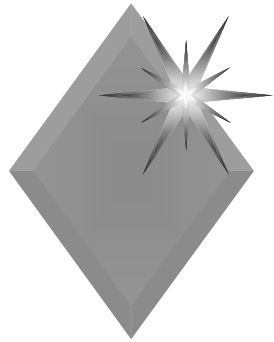




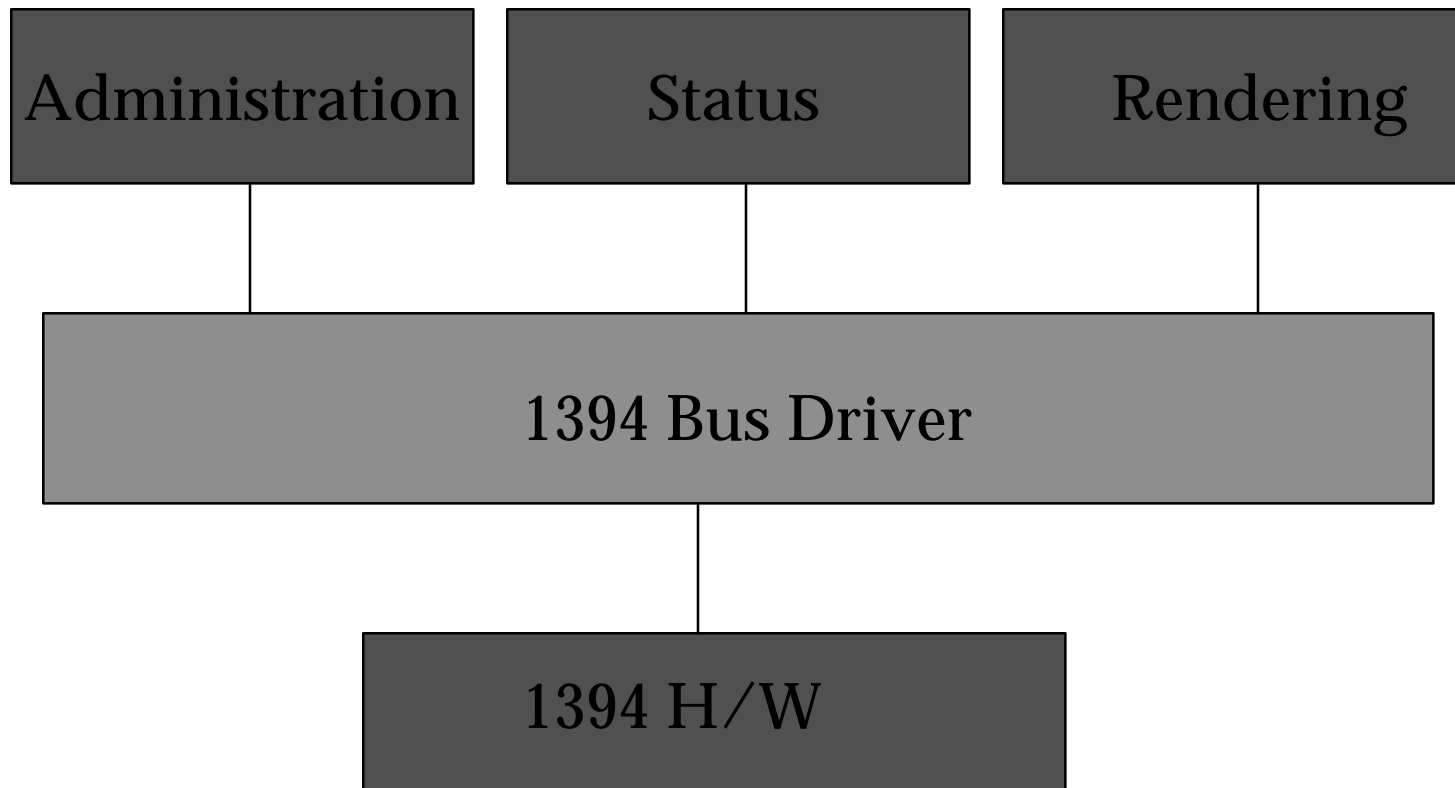
Scope

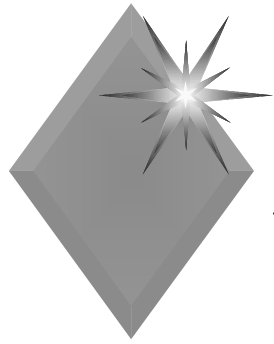
Proposal covers a range of solutions

- ◆ Print Servers
- ◆ Printer clusters
- ◆ Printer emulators
- ◆ Bit Image Printers
- ◆ Printers with internal halftoning
- ◆ PDL Printers
- ◆ Multi-Function Devices
- ◆ Video printers
- ◆ Plotters (Vector and/or Bit Image)



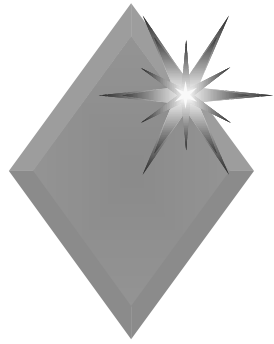
Software Model





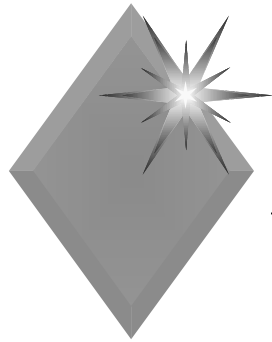
Printer Classes Defined

- ◆ Class A
 - ◆ Intelligent Devices with PDL, Servers
- ◆ Class B
 - ◆ Image data encoded with commands
- ◆ Class C
 - ◆ Raw Image data

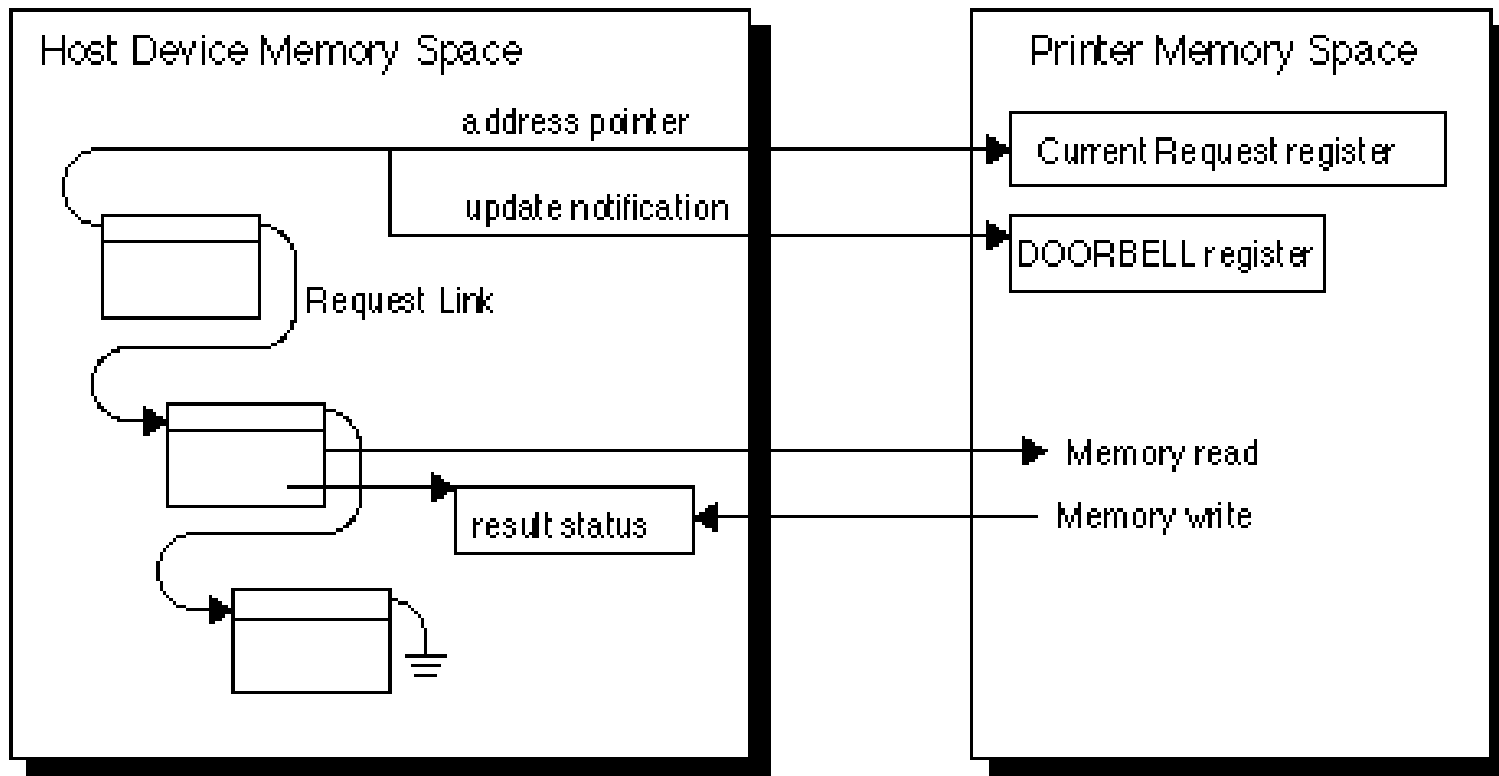


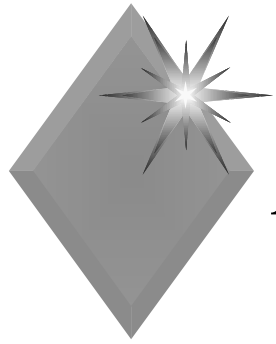
Features of the Protocol

- ◆ Memory Bus Architecture (like SBP-2)
 - ◆ Multiple hosts connectivity for print servers
 - ◆ Interactive Communication
- ◆ Isochronous capability
- ◆ Others
 - ◆ Windows Plug & Play agent
 - ◆ MLC support - (IEEE 1284.4 emulation)
 - ◆ Device to device communication



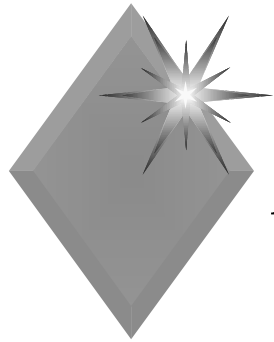
Memory Bus Model



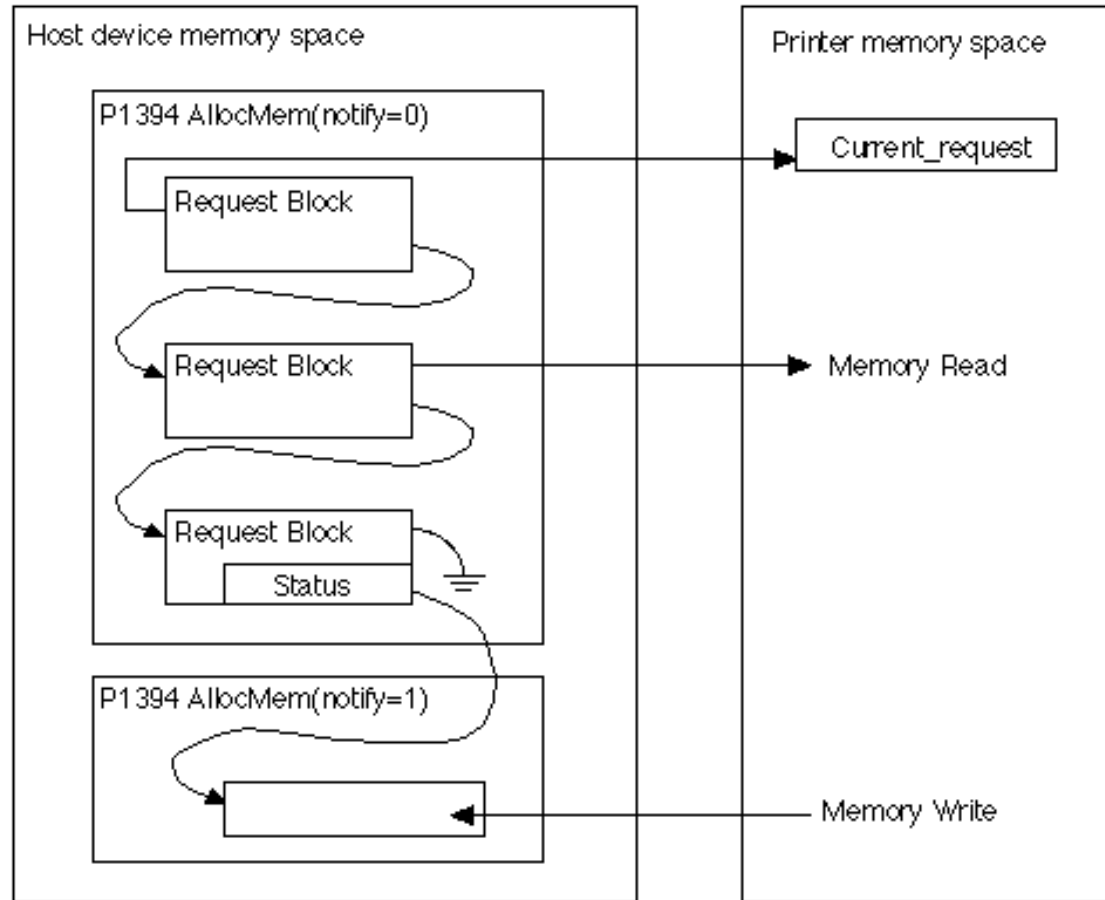


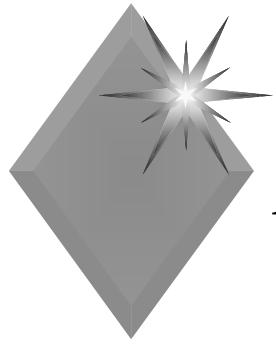
Memory Bus Benefits

- ◆ Printer fetches data on an as needed basis from host memory space.
- ◆ Minimal host overhead to service device.
- ◆ Can be scaled to work with a variety of hosts.



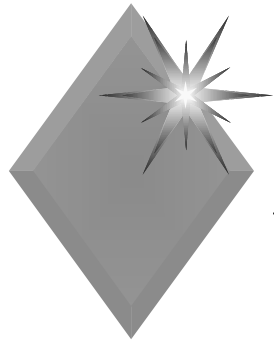
Multiple Block Transfer





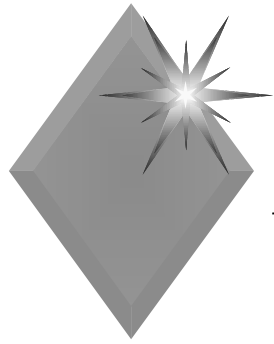
Data Transfer Model

- ◆ Following discussion explains the various agents within the device used to handle the communications tasks.
- ◆ Please refer to the proposal for more detailed discussion of the agent functionality.
- ◆ Agent - Software object that receives requests and provides services



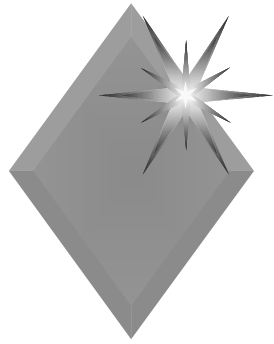
Printing Protocol Agents

- ◆ Login Agent
 - ◆ Async / allowable from any state
- ◆ Operation Agent
 - ◆ Async / instance created at login
- ◆ Management Agent
 - ◆ Async / allowable from any state
- ◆ Plug and Play Agent
 - ◆ Async / allowable from any state



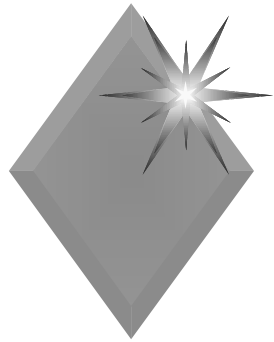
Login Agent

- ◆ Provides multiple hosts connectivity
 - ◆ Creates instance of Operation agent when login is successful.
 - ◆ Creates a Delegation agent when the status request is received or when the connection channels are occupied.
 - ◆ Delegation Agent - Async / allowable from any state

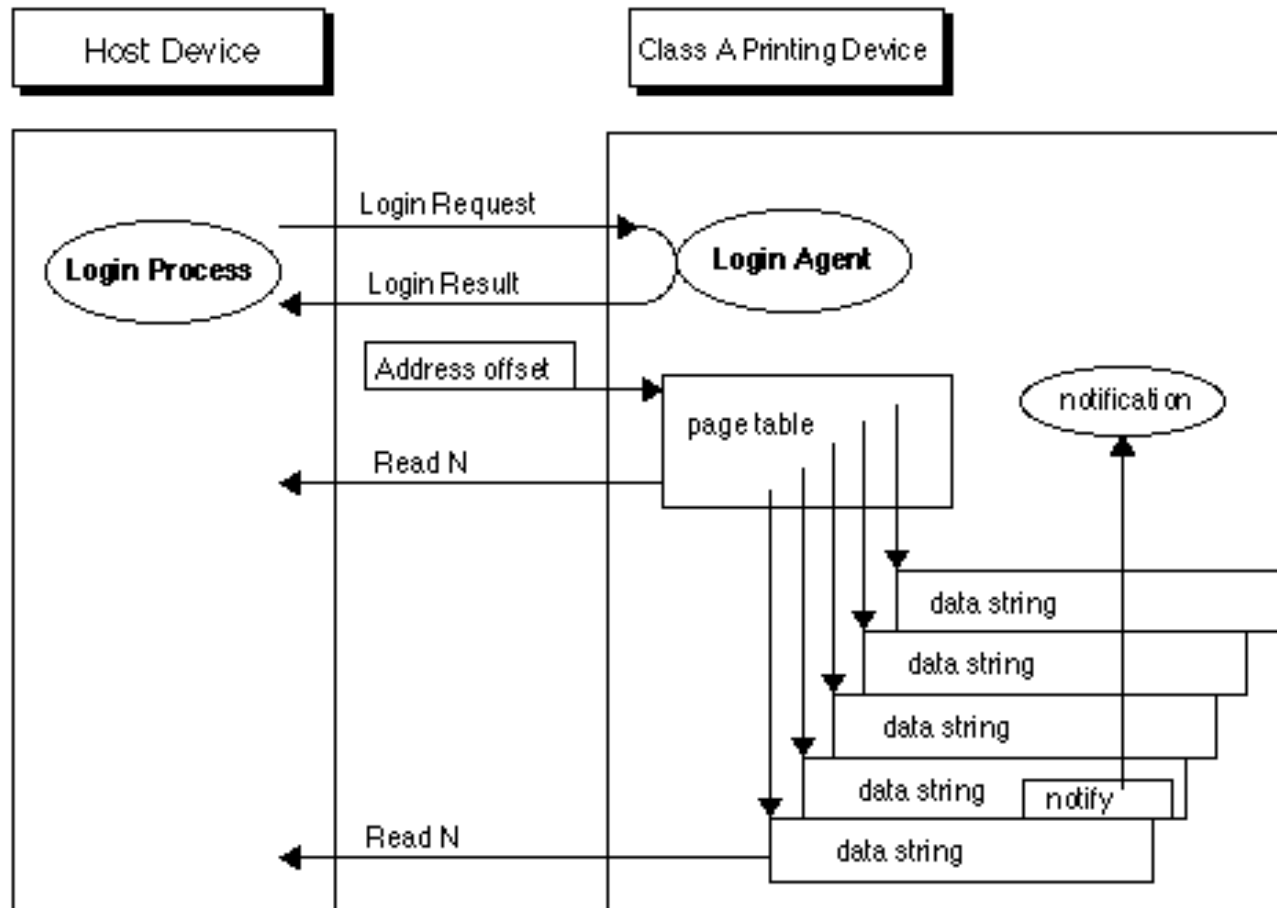


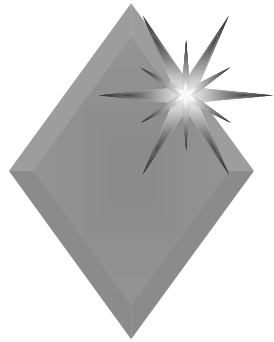
Operation Agent

- ◆ Consists of these four agents
 - ◆ Conventional Agent - Async
 - ◆ Fetches the print job from the host memory
 - ◆ Reverse direction Agent - Async
 - ◆ Writes the reverse data into printer and notifies host
 - ◆ Interactive Agent - Async
 - ◆ Handles interactive sessions with host
 - ◆ Stream Control Agent - Isochronous Sessions

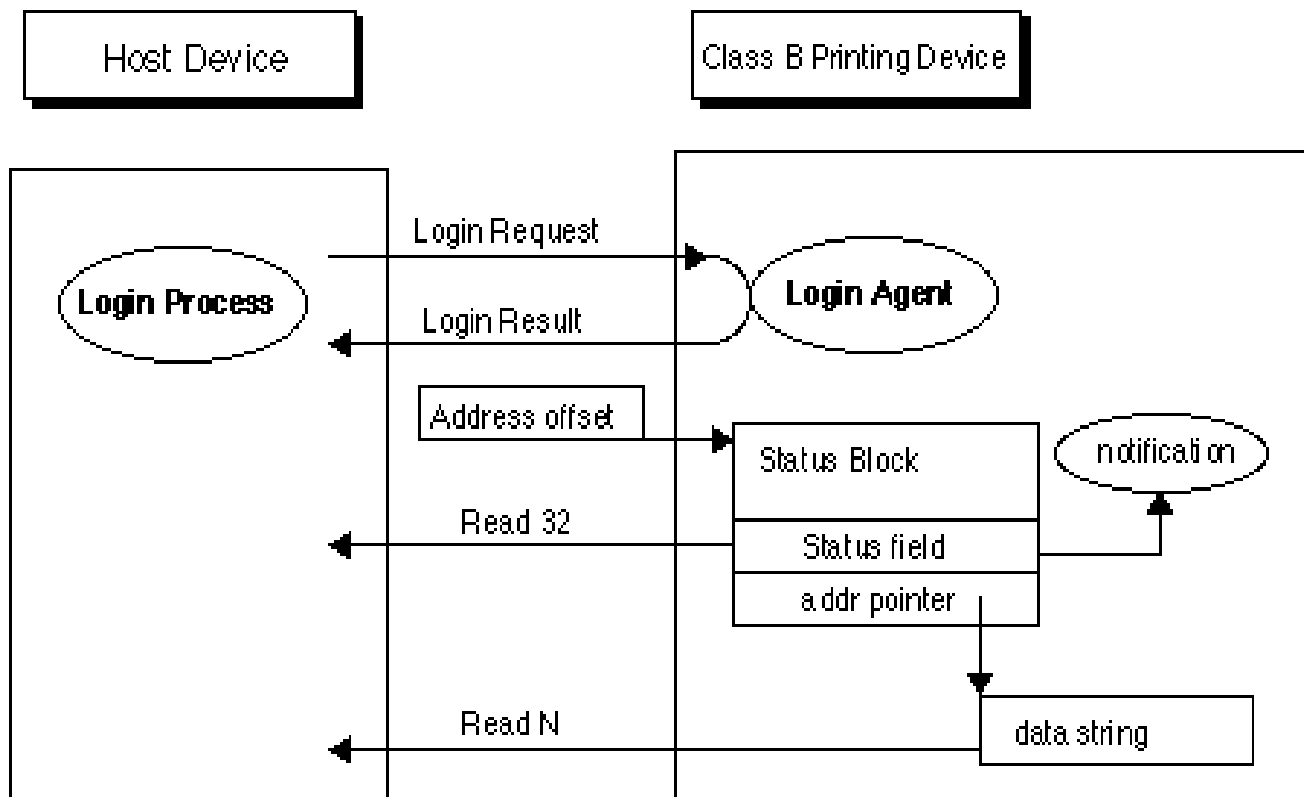


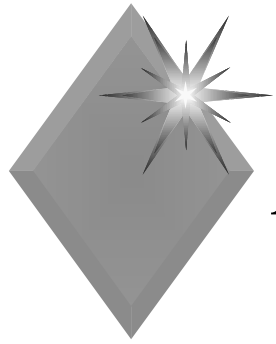
Class A Printing





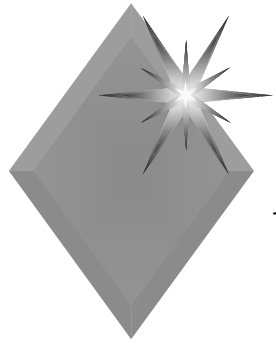
Class B Printing





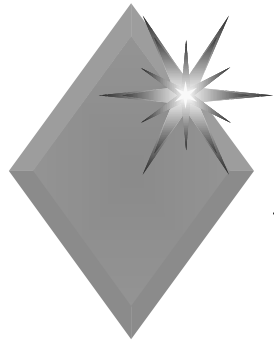
Management Agent

- ◆ Provides the process management for an entire session
 - ◆ In case of a bus reset, it will invoke a reconnection transaction
 - ◆ Job abort sequence
 - ◆ Power management



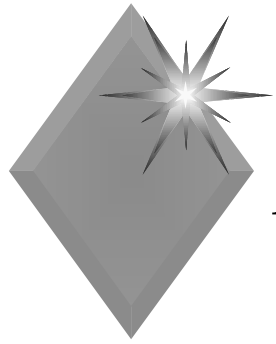
Plug and Play Agent

- ◆ The plug and play agent is a form of delegation agent which services login-less connections to fetch the Plug and Play ID from the target printer.



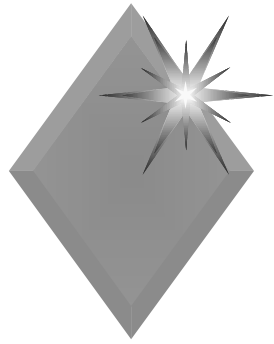
Printer Class Functionality

Agent	Class A	Class B	Class C
Login			
Conventional			
Reverse direction			
Interactive			
Plug and play			
Stream Control			
Management			



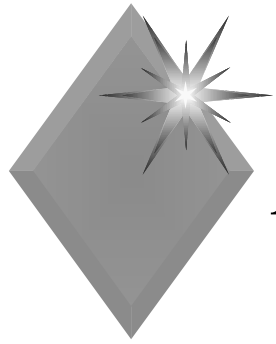
Implementation Requirements

- ◆ All Printers must provide
 - ◆ Printer Doorbell Register
 - ◆ Current Request Register
 - ◆ Status Base Register
 - ◆ Agents
 - ◆ Login, Operations, Management
- ◆ This does not preclude other implementation specific details



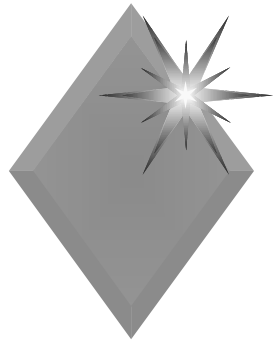
Summary

- ◆ Encapsulates existing streams maintaining vendor's software investments.
- ◆ Covers existing solutions
- ◆ Extensible to support new applications
- ◆ Makes efficient use of available bandwidth
- ◆ Vendor Neutral



Next Steps

- ◆ Review this proposal and others
- ◆ Ask questions
- ◆ Discuss them on the reflector
- ◆ Define scope of the work required by the group



Contact Info

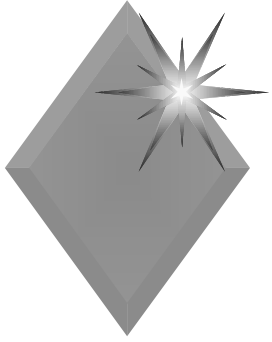
- ◆ EPSON

- ◆ EMAIL: pp1394@erc.epson.com

- ◆ WWW: <http://www.ercipd.com/pp1394/>

- ◆ 1394-TA Printer Working Group

- ◆ 1394-prt-img@fireflyinc.com



Thank You!