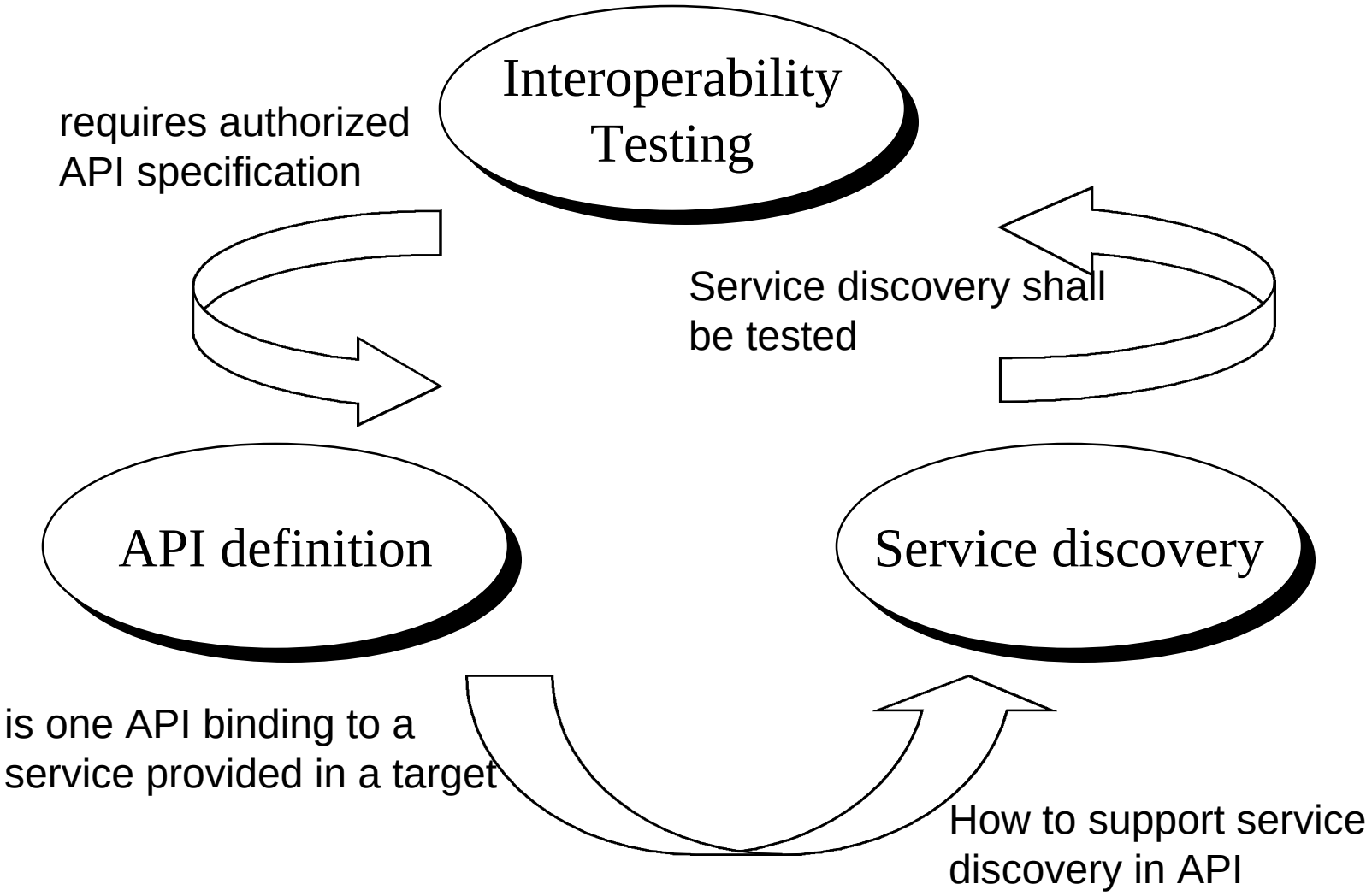
Introduction for

SPI mapping
Service Discovery
Interoperability Testing

20, Sep. 1999 1394 PWG

Fumio Nagasaka

Open Issues are related to each other



Service Provider Interface mapping for PPDT

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20, Sep. 1999

Why API ?

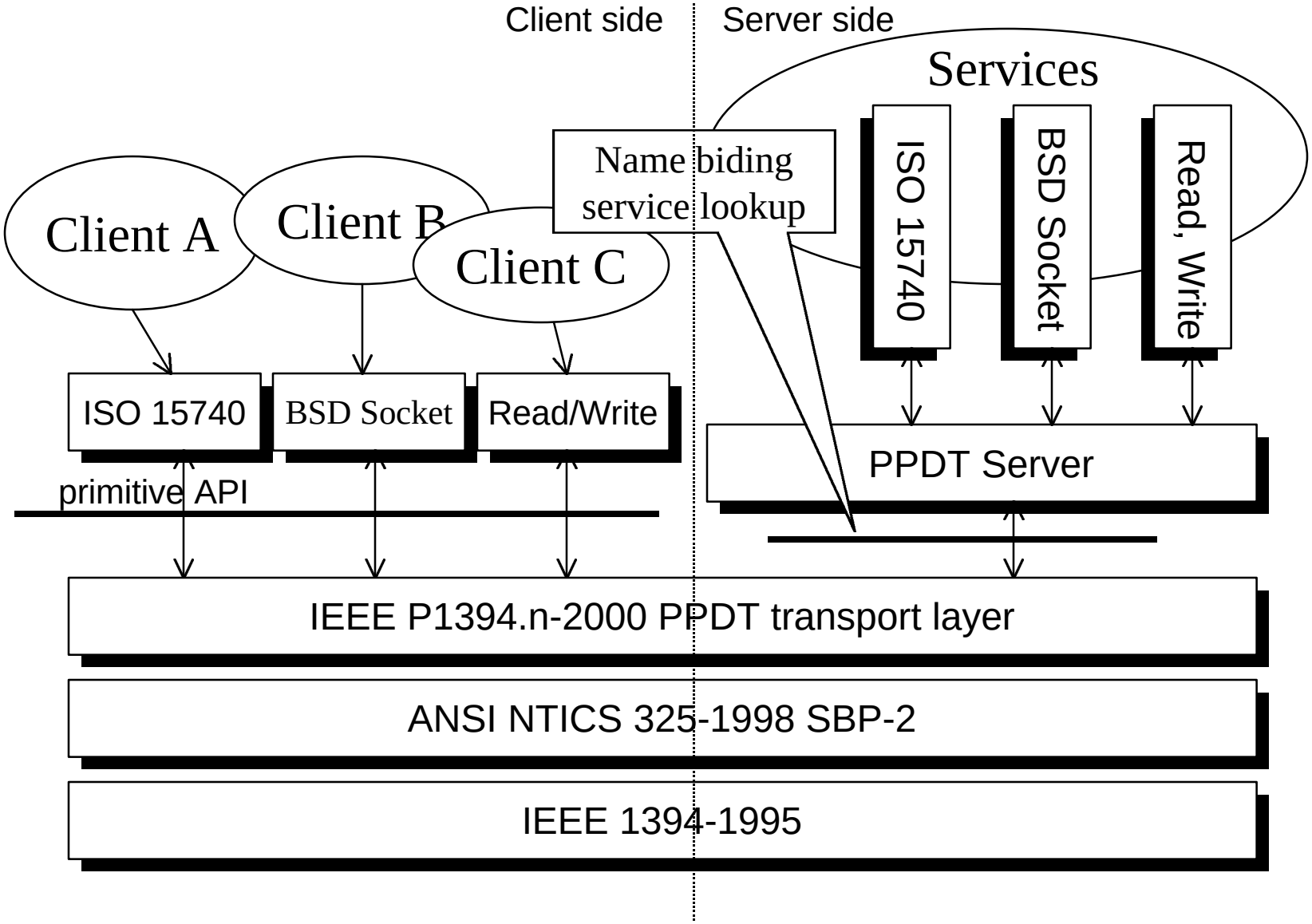
- Still API definition is an open issue
- Clients use API
- Interoperability testing requires authorized API

API policy, Type A

- API only includes few atomic functions
- Layered wrapper class satisfies more complex requirements from a client

- Pros
  - simple
- Cons
  - layered overhead and redundancy

Example of Type A

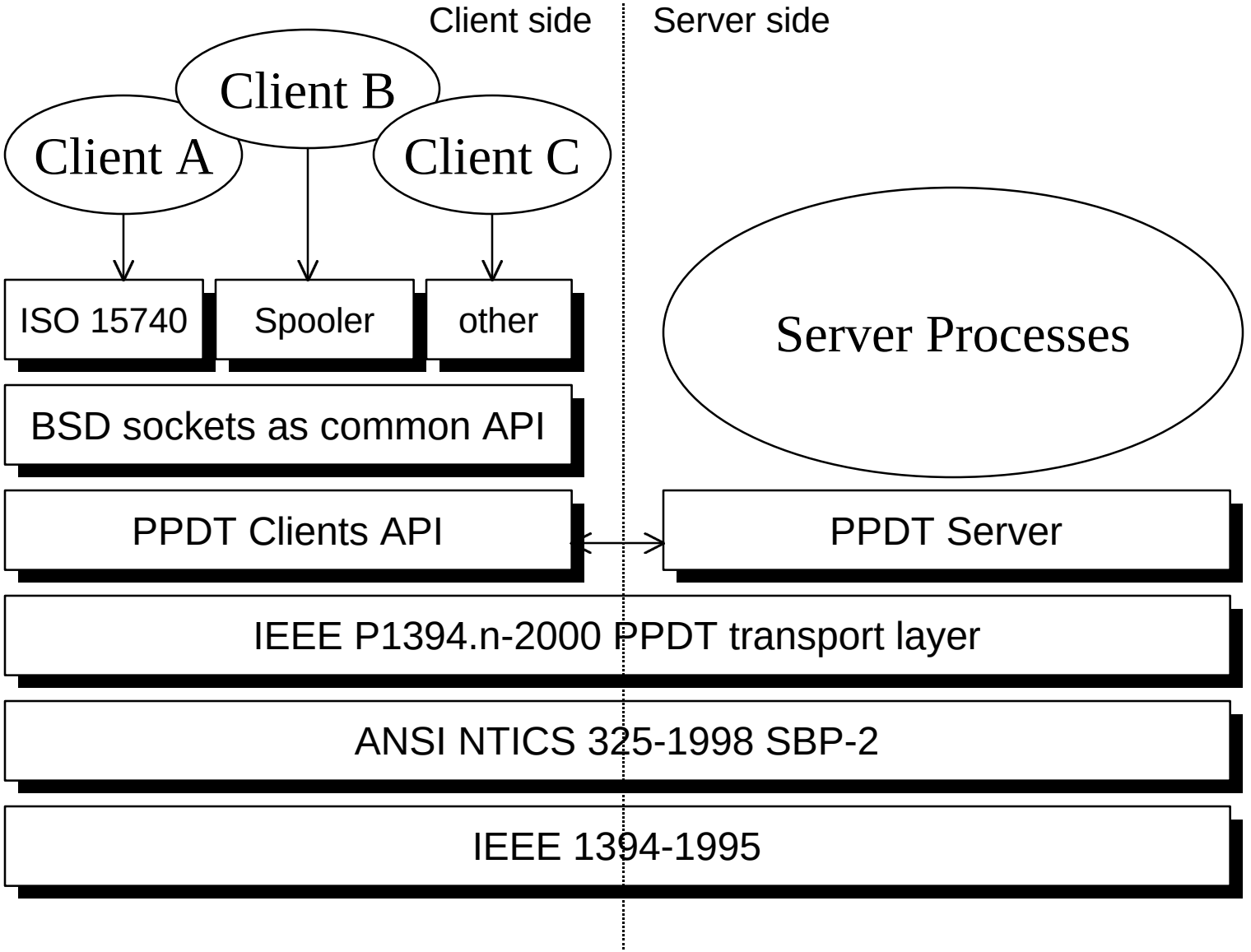


API policy, Type B

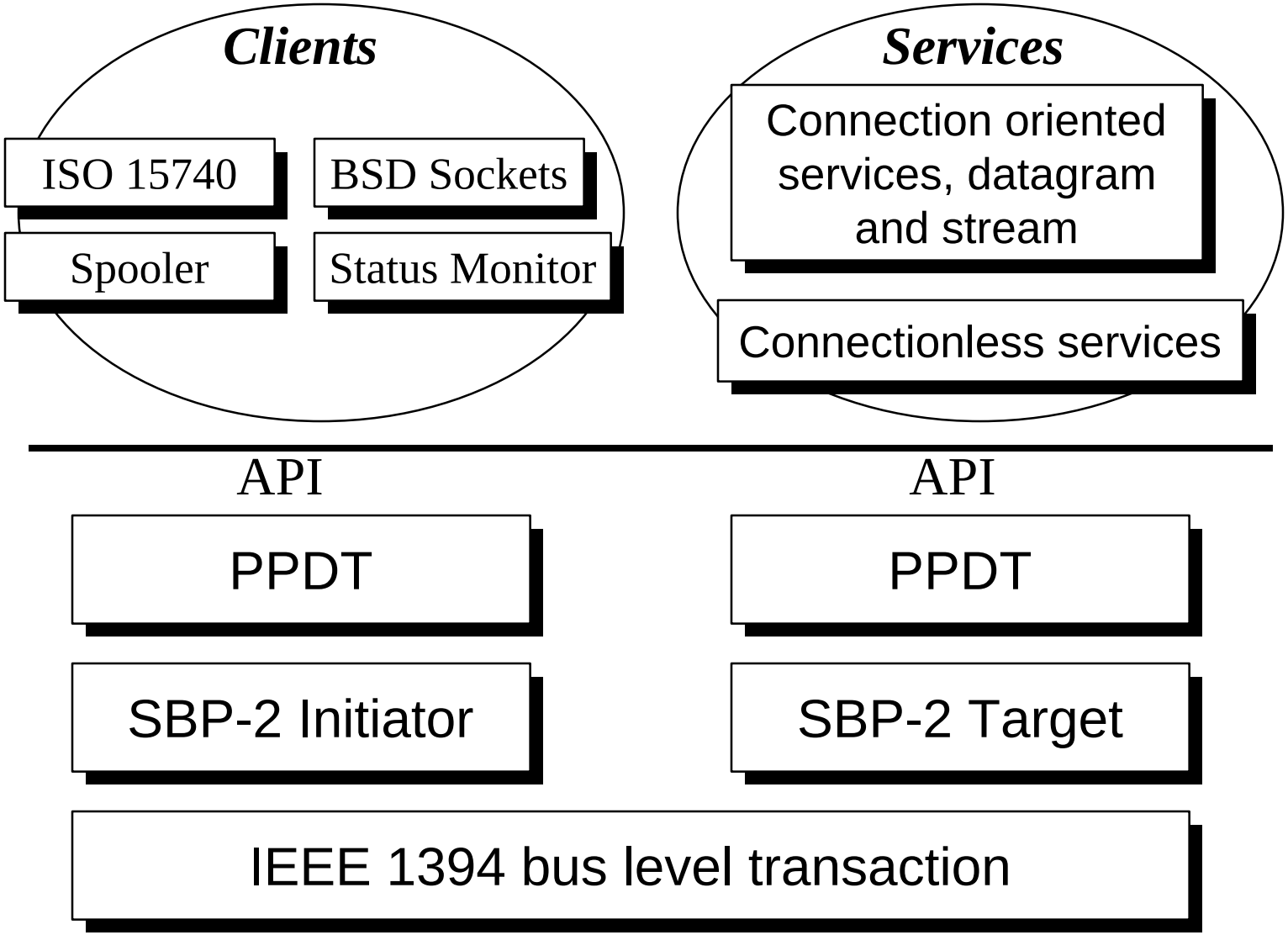
- well examined traditional set of functions
- common access from several types of clients (for example BSD sockets?)

- Pros
  - reusability and compatibility with existing protocol
- Cons
  - every common set has exceptions

Example of Type B

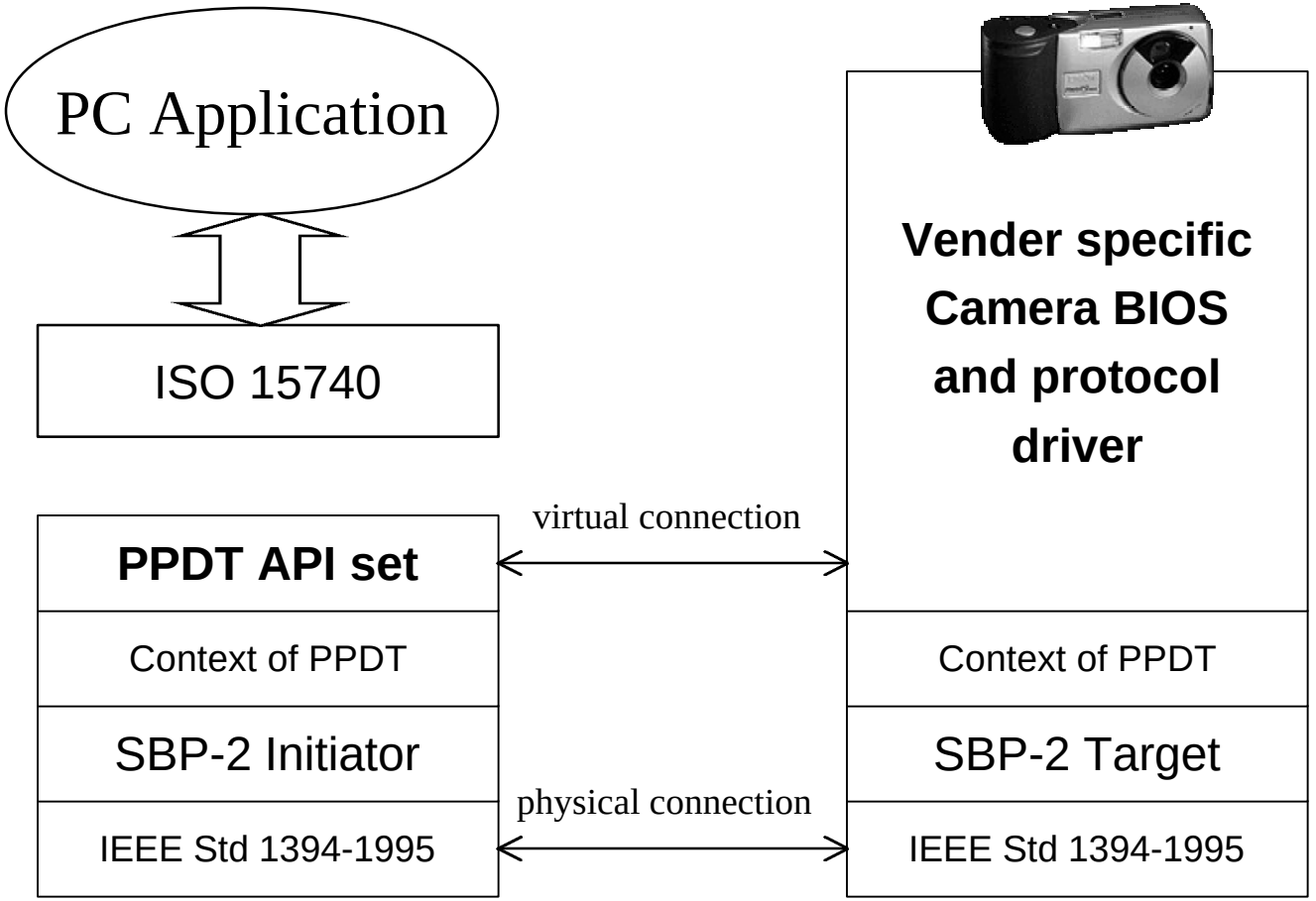


what shall ppdt-API provide?



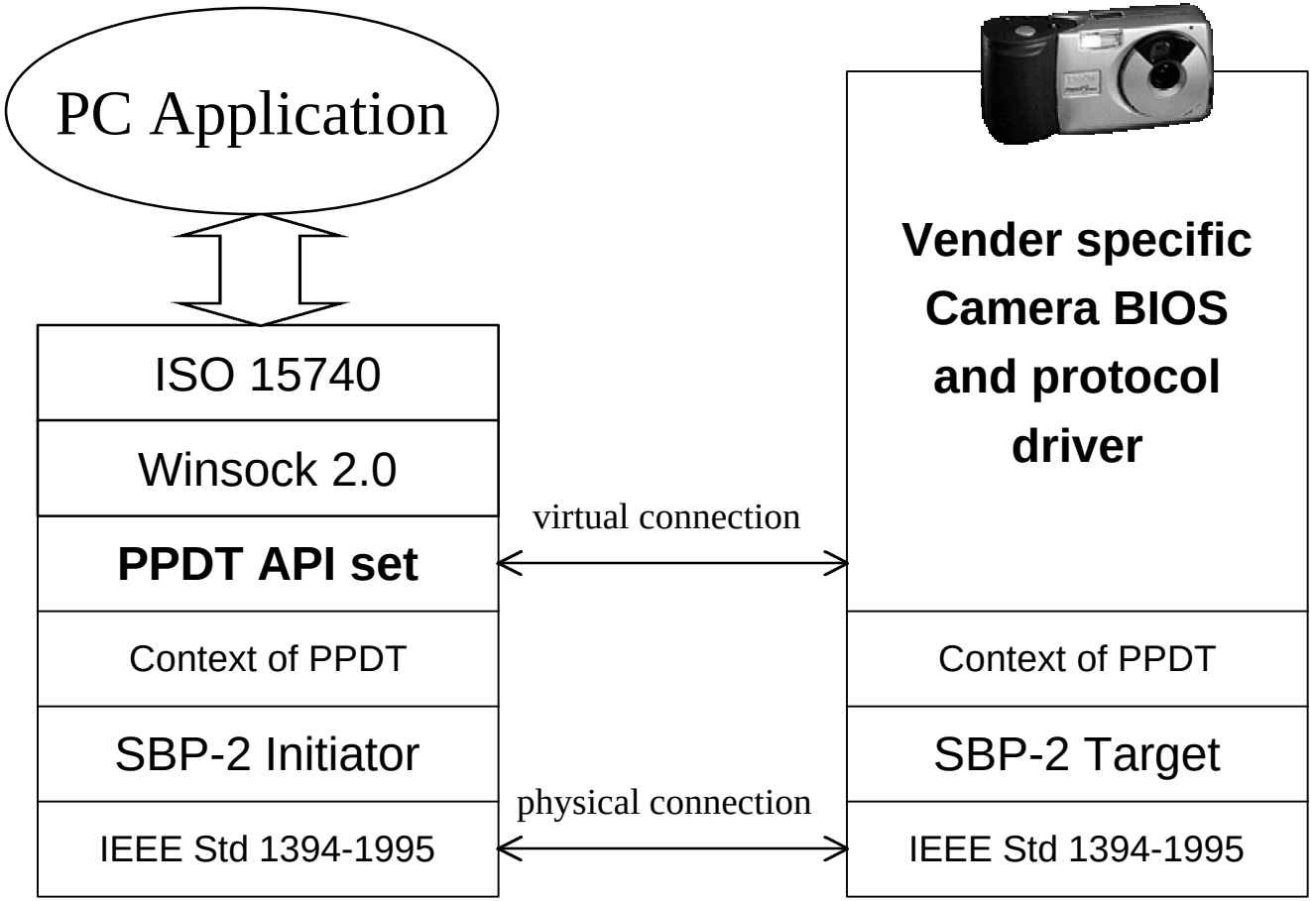
Example 1

– Camera may use ISO 15740(PTP) directly over PPDT



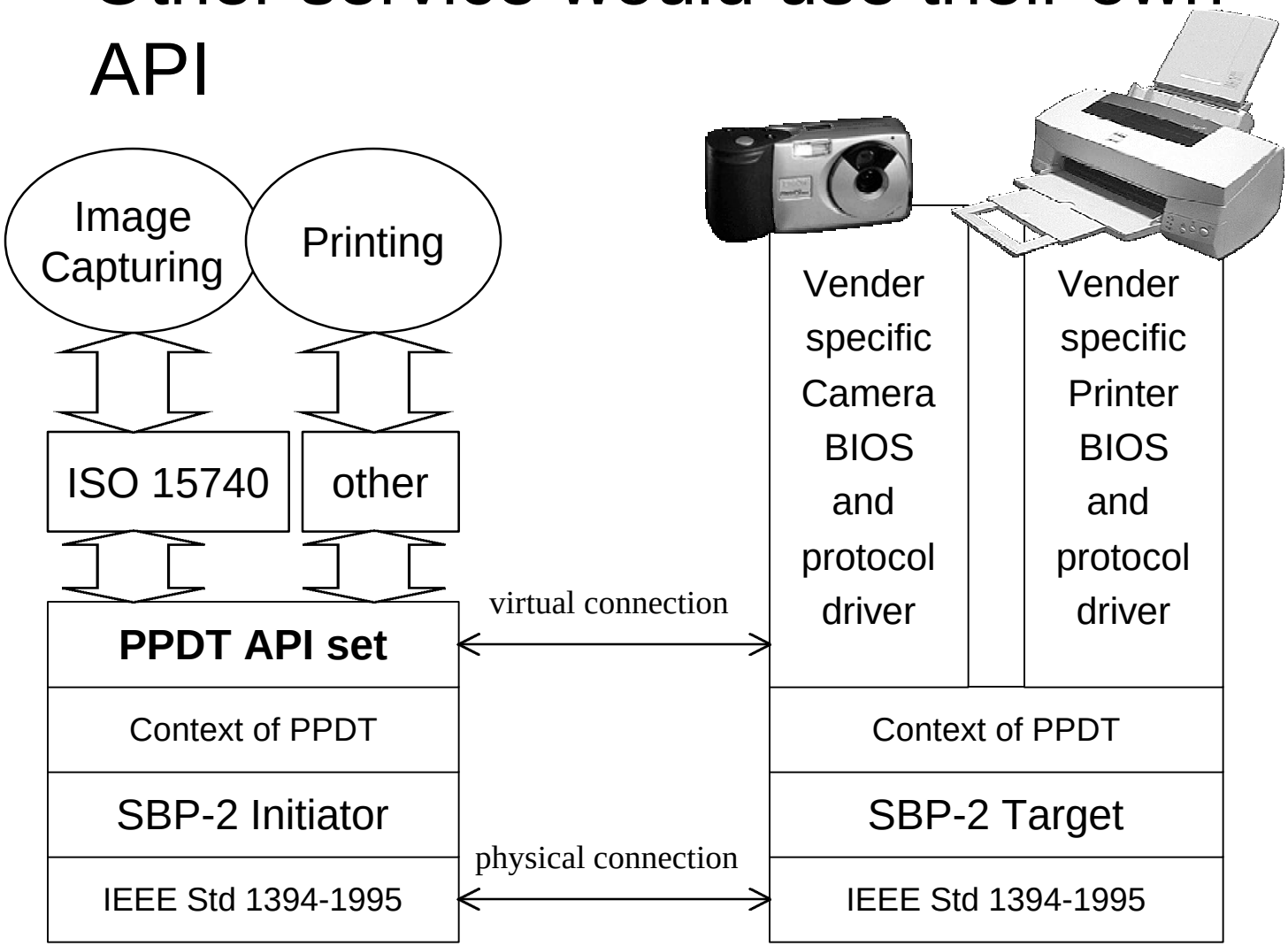
Example 2

– Camera may use ISO 15740(PTP) over common API like Winsock 2.0



Example 3

– Other service would use their own API



Abstraction

- Application shall be abstracted from a transport

PWG shall assume four clients

- Print Spooler
- Status Monitor
  - normally connected services with read/write/open/close style API
- ISO 15740
  - connection oriented session layer requires {event, operation, data transfer and response}, PC2001 requirements for image input device
- BSD Sockets

Services and Clients

- Symmetry of PPDT allows each peer to start session
- Symmetry of PPDT requests both PPDT at SBP-2 target and PPDT at SBP-2 initiator to provide same API for their clients process

Proposal

- { PPDT server at a target, PPDT server at an initiator, PPDT client at a target and PPDT client at an initiator } require different design, consequently these are different contexts.

- To facilitate these contexts to have common API for client applications, ***make wrapper class for each context***.
- Common API shall ***be Socket Style API***.
- Address family shall be ***AF_1394PWG***.

Proposal (continued…)

- PPDT server implementation shall provide service-name registry
  - PPDT context shall not have static name string programmed in source code, but PPDT context shall have internal name space known as name registry.
- Client processes of PPDT server may register service name utilizing API

Address family registration

- **The 1394 PWG shall contact Windows Socket 2 Identifier Clearinghouse.**

- **Address families are shown from,**
  - http://www.stardust.com/wsresource/winsock2/ws2ident.html

Case Study for BSD Socket

following up Brian’s idea

Socket API

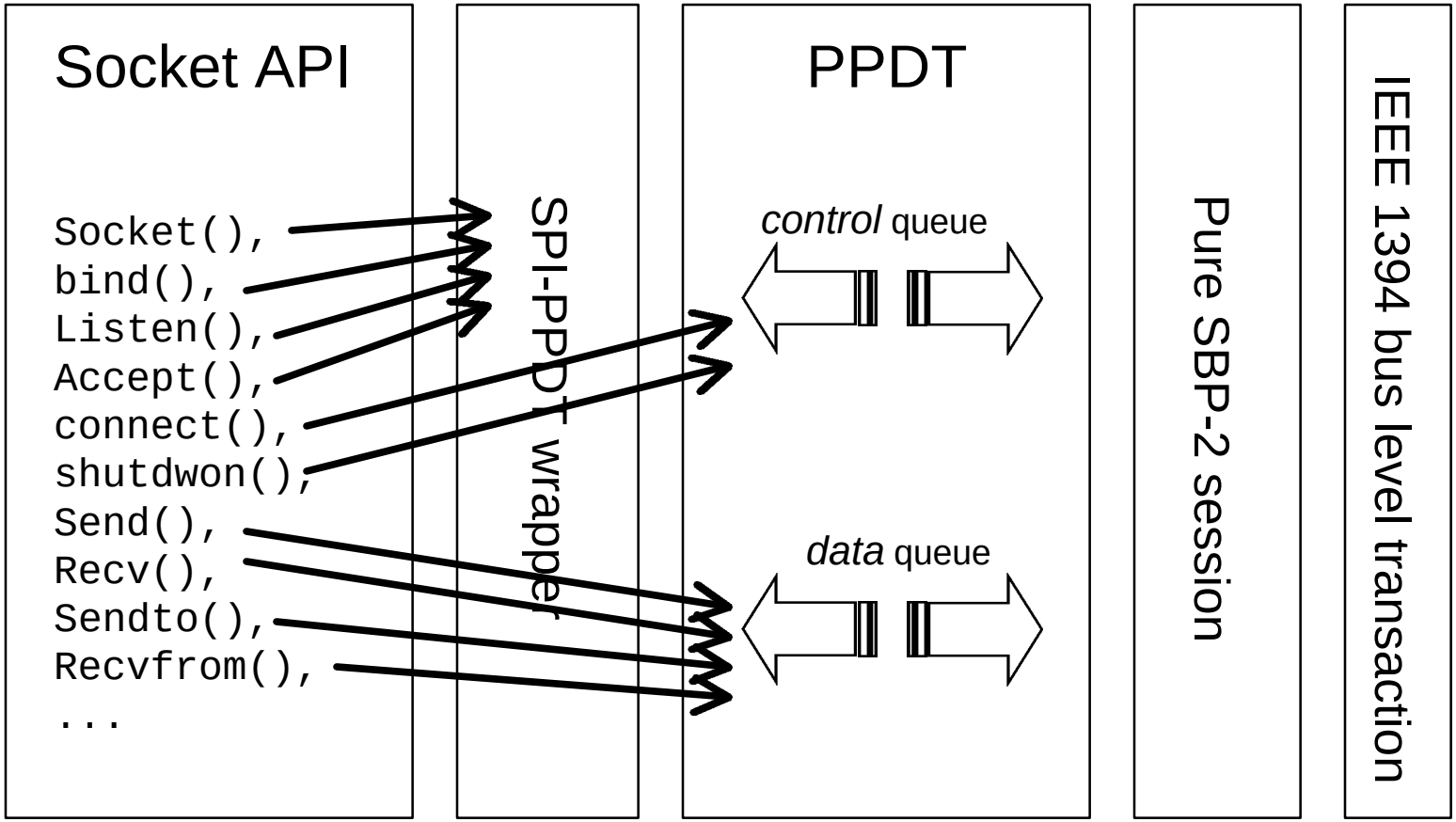
- BSD UNIX Sockets normally requires association of the set of
  - { ***protocol, local-addr, local-process, foreign-addr, foreign-process*** }
- PPDT requires association of the set of
  - { ***mode, local-addr, client-application, foreign-addr, service*** }

PPDT facilities

- PPDT provides two types of queue
  - Control queue
    - *queue* == 0
    - Open/Close uses management queue
  - Data transaction queue
    - *queue* <> *0*
    - Read/Write uses data transaction queue

Service Provider I/F wrapper

- *SPI requires wrapper layer to map each functions to PPDT queues*



Socket

int socket(int $family$, int $type$, int $protocol$);

- each context of PPDT peer internally allocate working memory and build task set.

Listen

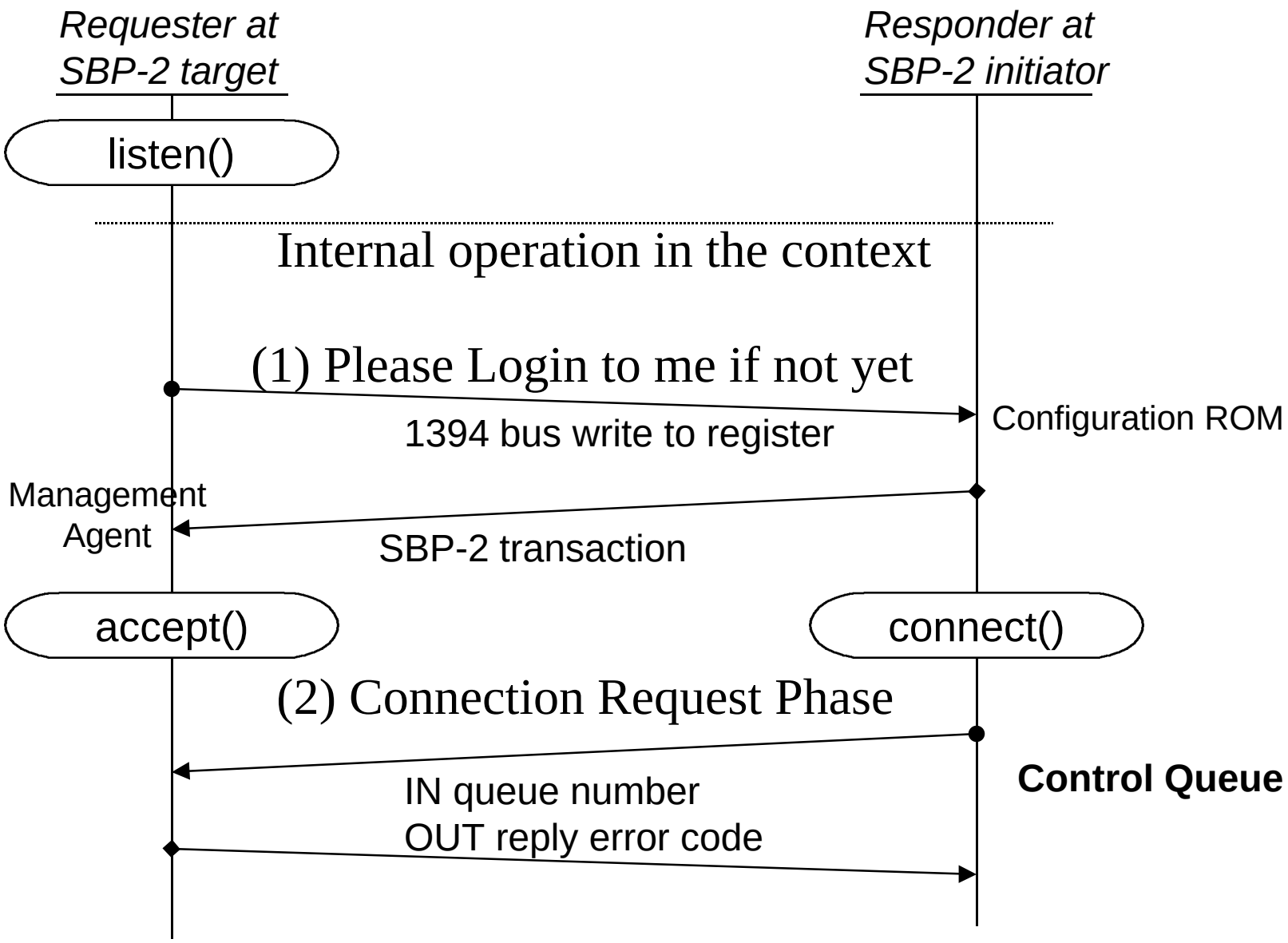
int listen(int *sockfd*, int *backlog*);

sockfd : socket descriptor,

backlog : maximum ***task set*** *size.*

- PPDT server on SBP-2 initiator tries to LOGIN to the target device, if not yet logged in,
- PPDT server on SBP-2 target indicate the initiator to solicit LOGIN, if yet the initiator has not logged in.

Listen (continued …)



Accept

int accept(int *sockfd*, struct sockaddr **peer*, int *addrlen*);

sockfd : socket descriptor,

peer : address of the connected peer,

addrlen : length of the data structure listed in previous line .

Accept (continued …)

- PPDT server on SBP-2 initiator provides control queue to accept “connect()” request,

- PPDT server on SBP-2 target initialize the fetch agent for the control queue.

Bind

- the server of connection oriented transport requires bind() to register the mapping for a service descriptor and a queue number.
- The client and the server of connectionless transport also requires to call bind() by the same reason.

Bind (continued …)

Client application of a server calls this function to map service name and queue number in its name space.

int bind(int *sockfd*, struct sockaddr **myaddr*, int *addrlen*);

sockfd : socket descriptor,

myaddr : protocol specific data structure for address,

addrlen : length of data structure specified in previous line,

Bind (continued …)

protocol specific data structure requires;

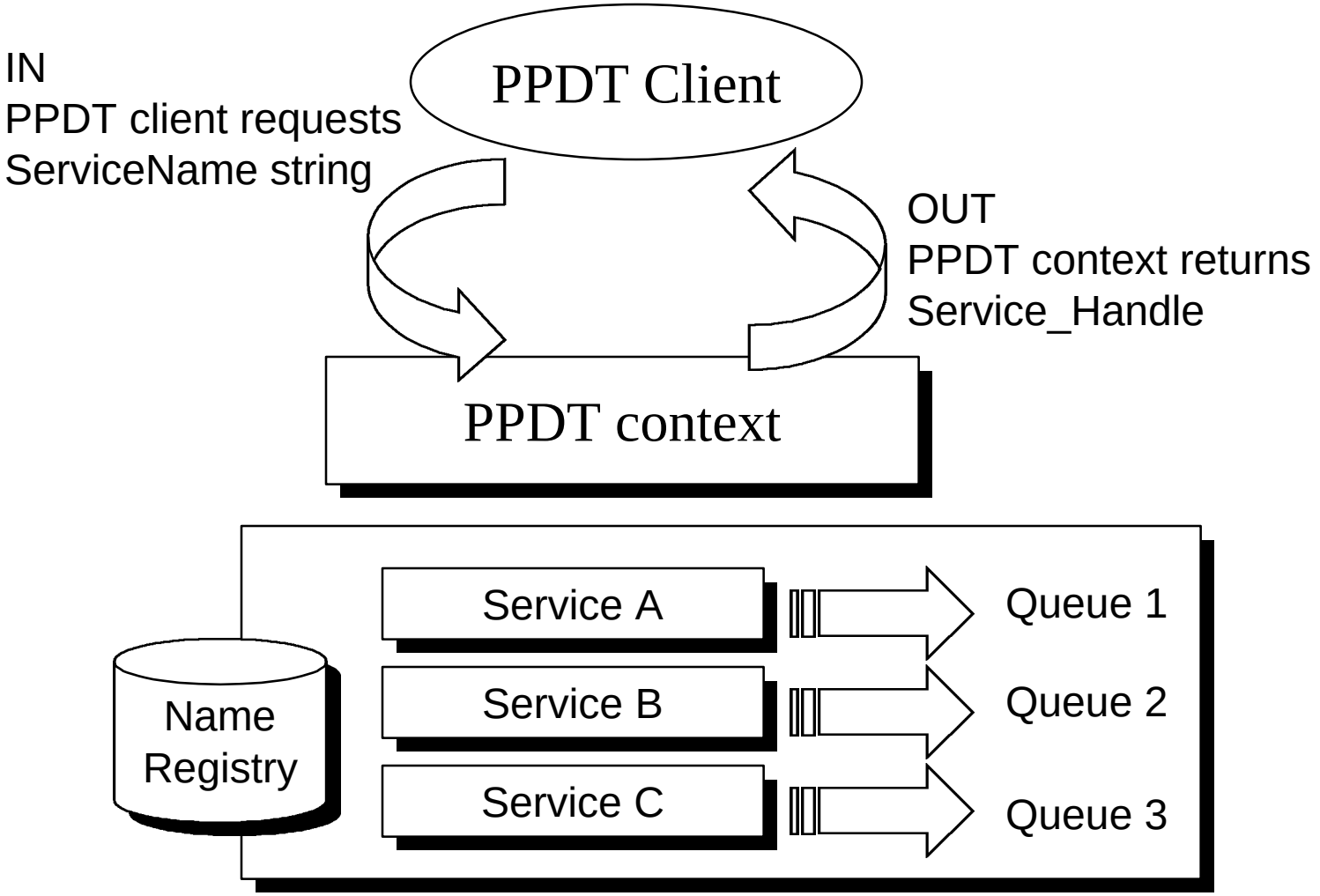
{ service handle, service name, node GUID }

- the pair of [service handle] and [service name] is internally registered and stored in name space of the server.
- the implementation of “Bind()" for a PPDT at a target and a PPDT at an initiator might be same.

Proposal

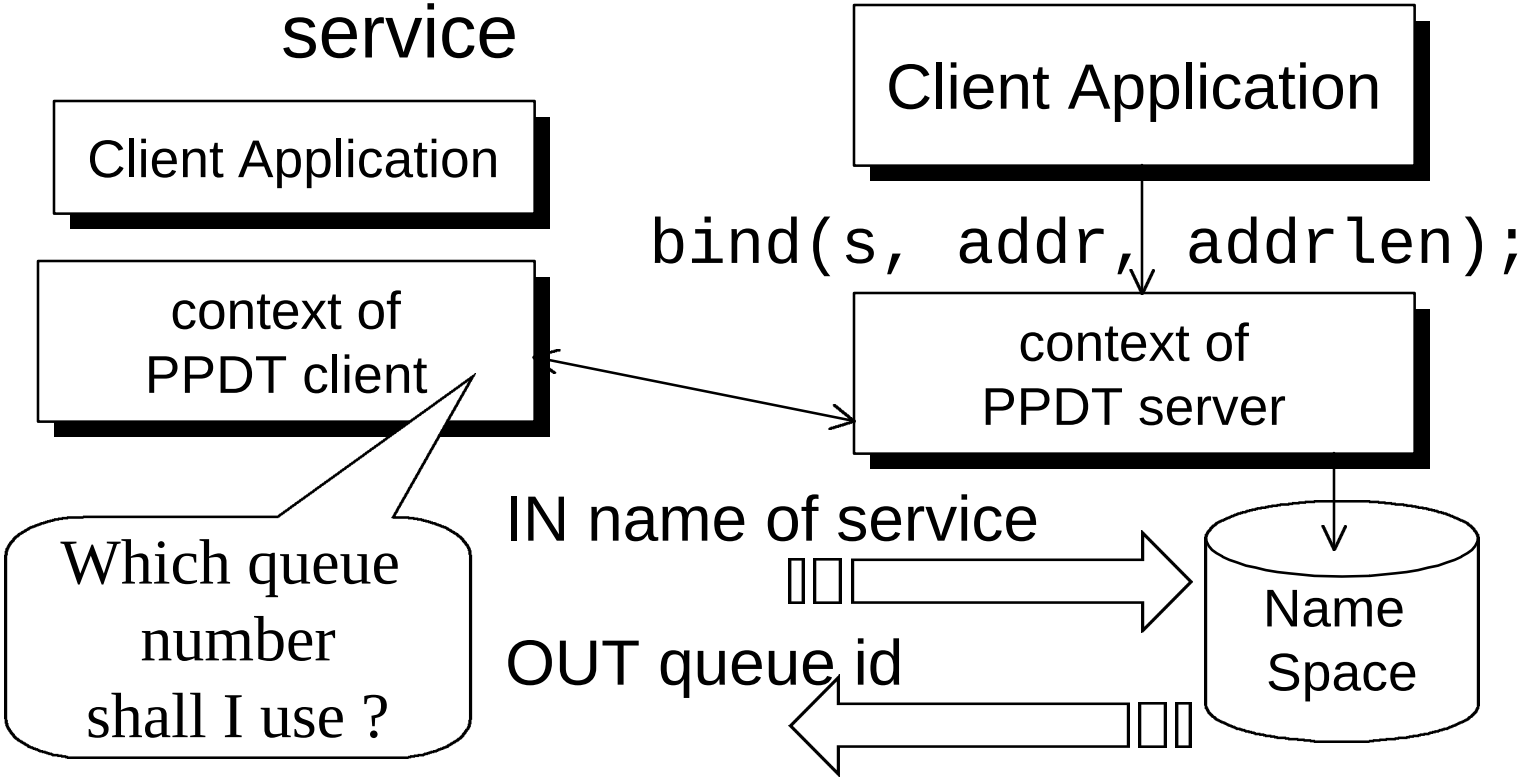
- PPDT client specifies the ASCII string of required service
- PPDT context returns the service handle of associated service
- The service handle shall be associated internally for queue id
- The context shall keep association described above

Proposal *(continued …)*



Name space and queue id

- PPDT server context does not know ***Service ID***
  - client shall register the name string of service



Service Discovery

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20, Sep. 1999

Connect

- Connect specifies name of service utilizing ServiceDiscovery then gets service handle to connect

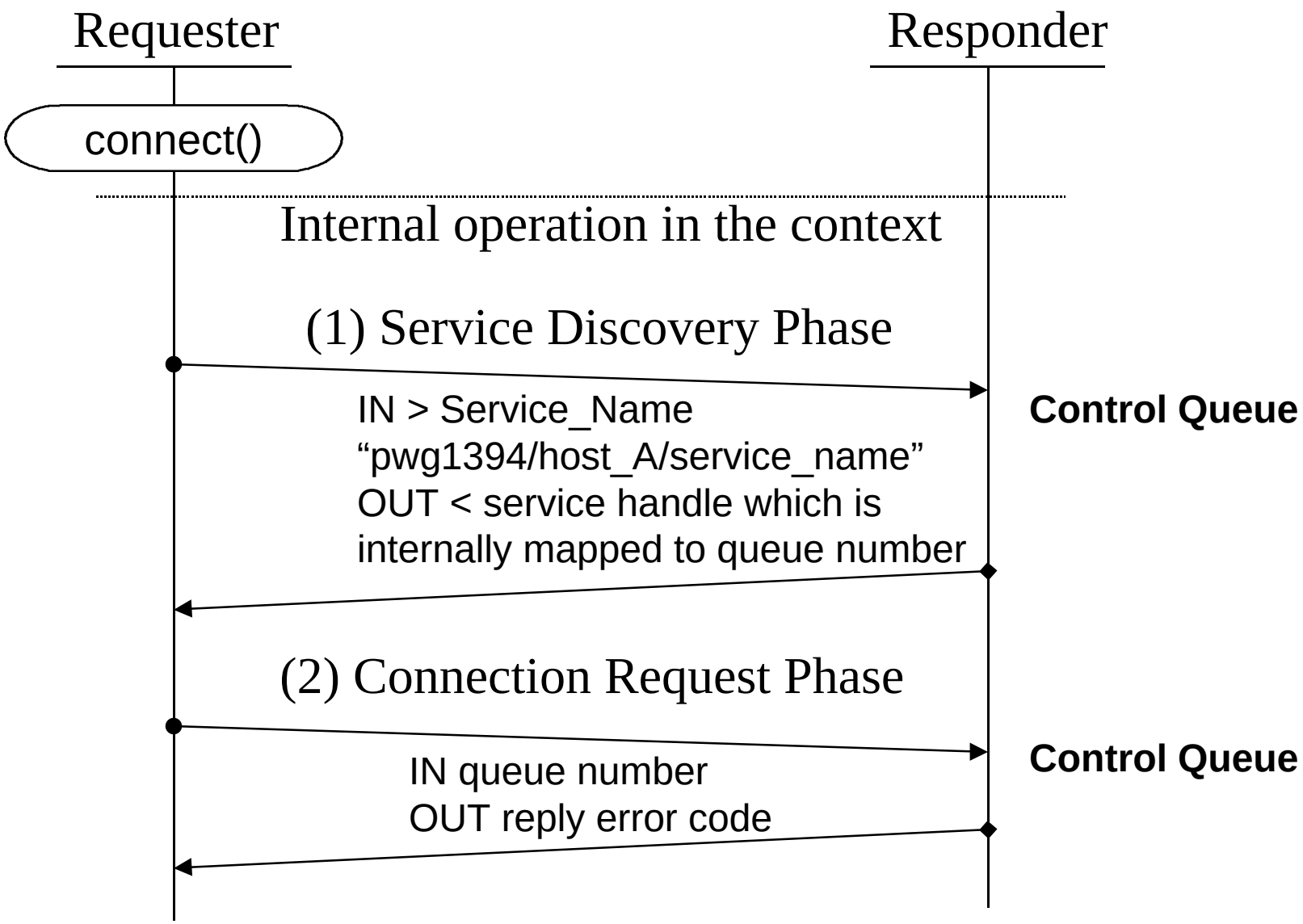
int connect(int *sockfd*, struct sockaddr **servaddr*, int *addrlen*)

sockfd : socket descriptor,

myaddr : protocol specific data structure for server's address,

addrlen : length of data structure specified in previous line,

Connect (continued …)



Send

int send(int *sockfd*, char **buff*, int *nbytes*, int *flags*);

sockfd : socket descriptor,

buff : output buffer,

nbytes : length of data in the buffer,

flags : `MSG_OOB` = send out of band data

Sendto

int sendto(int *sockfd*, char **buff*, int *nbytes*, int *flags*, struct sockaddr **to*, int *addrlen*);

sockfd : socket descriptor,
buff : output buffer,
nbytes : length of data in the buffer,
flags : `MSG_OOB` = send out of band data
to : destination address,
addrlen : length of data structure specified in previous line.

Recv

int recv(int *sockfd*, char **buff*, int *nbytes*, int *flags*);

sockfd : socket descriptor,

buff : output buffer,

nbytes : length of data in the buffer,

flags : { `MSG_OOB, MSG_PEEK` }

Recvfrom

int recvfrom(int *sockfd*, char **buff*, int *nbytes*, int *flags*, struct sockaddr **from*, int *addrlen*);

sockfd : socket descriptor,
buff : output buffer,
nbytes : length of data in the buffer,
flags : { MSG_OOB, MSG_PEEK },
from : source address,
addrlen : length of data structure specified in previous line.

Interoperability testing for PPDT

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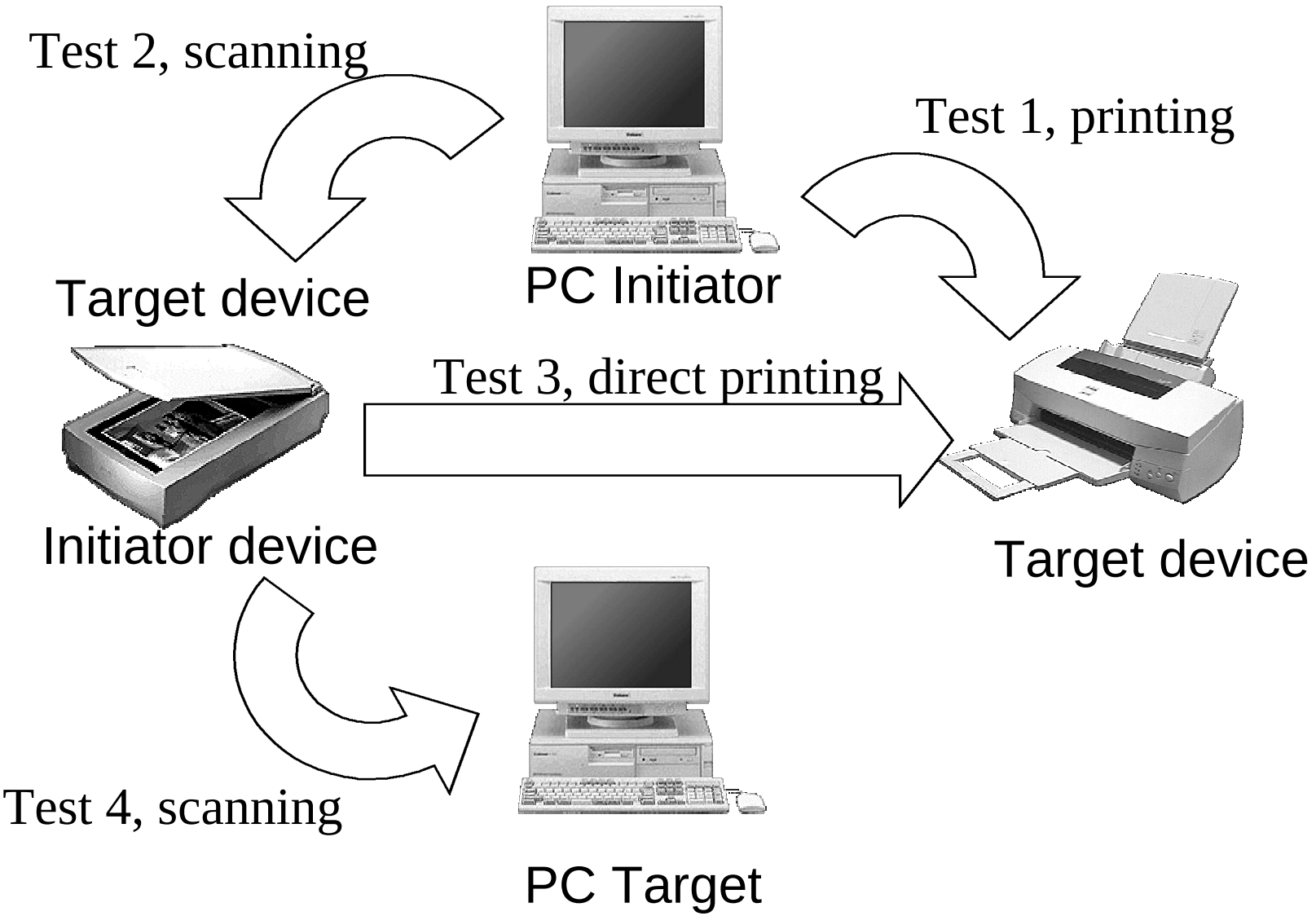
20, Sep. 1999

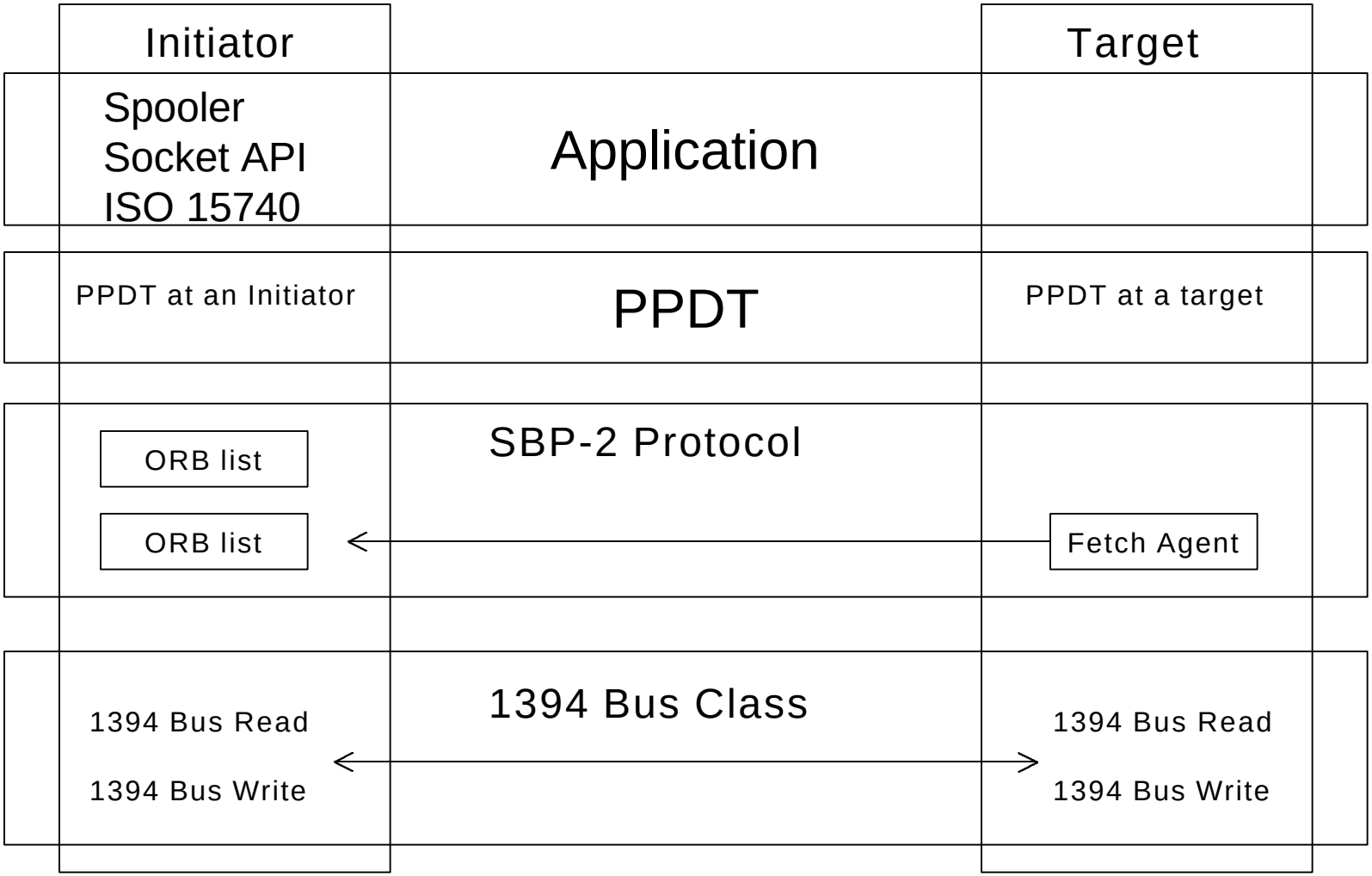
Testing cases



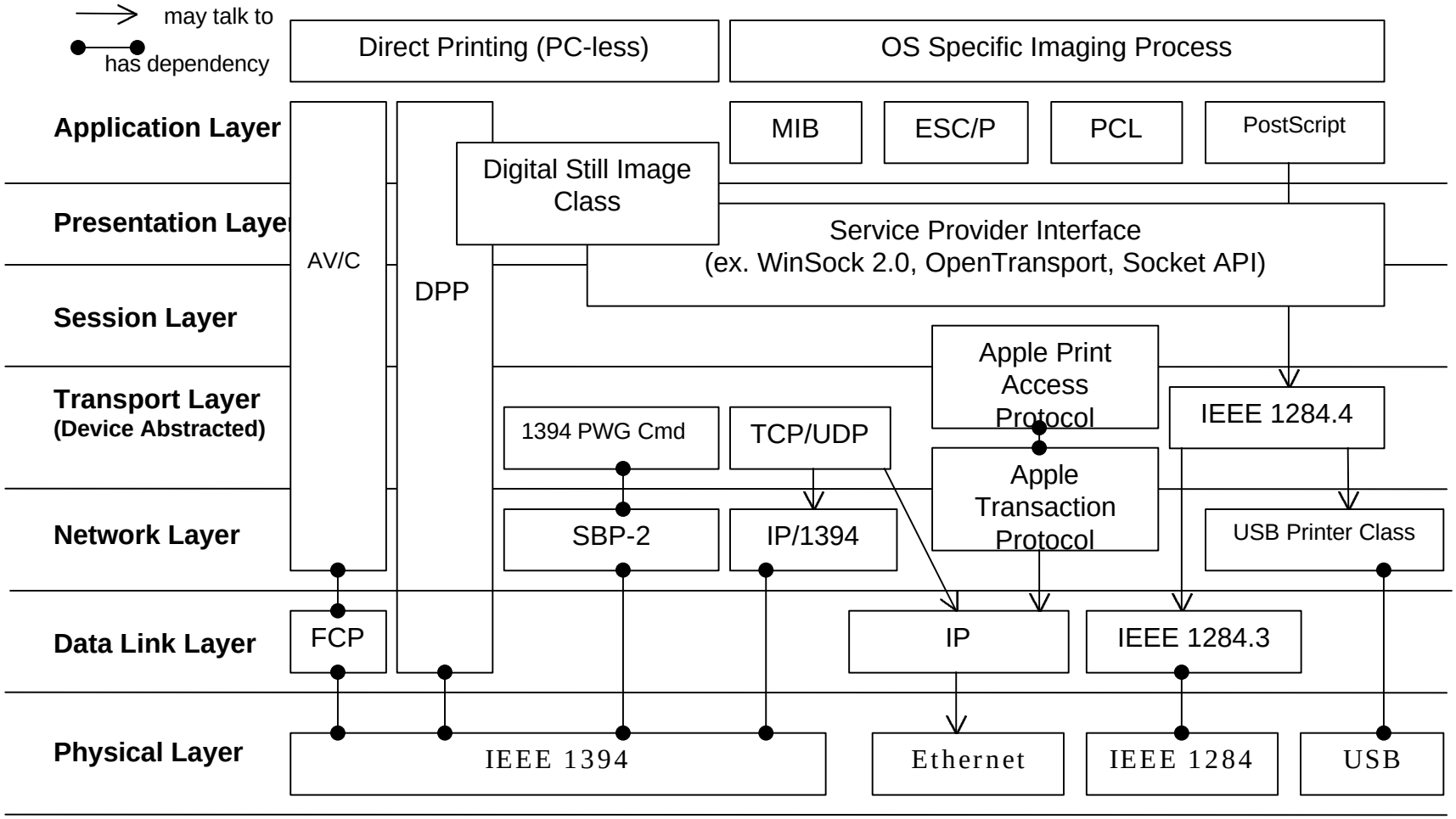
Testing cases

Case	operation	how to test
Testing 1	Printing from PC SBP-2 initiator to SBP-2 target printer	Use universal Printer Driver and PC based PPDT driver made by IHV
Testing 2	Scanning from SBP-2 target scanner to PC SBP-2 initiator	Use WIA or TWAIN application and PC based PPDT driver made by IHV
Testing 3	Direct Printing from SBP-2 initiator Scanner to SBP-2 target printer	IHV dependent solution No testing guidelines
Testing 4	Scanning from SBP-2 initiator Scanner to PC SBP-2 target	Use authorized PC PPDT server process and WIA or TWAIN compliant Scanner

Application for PPDT

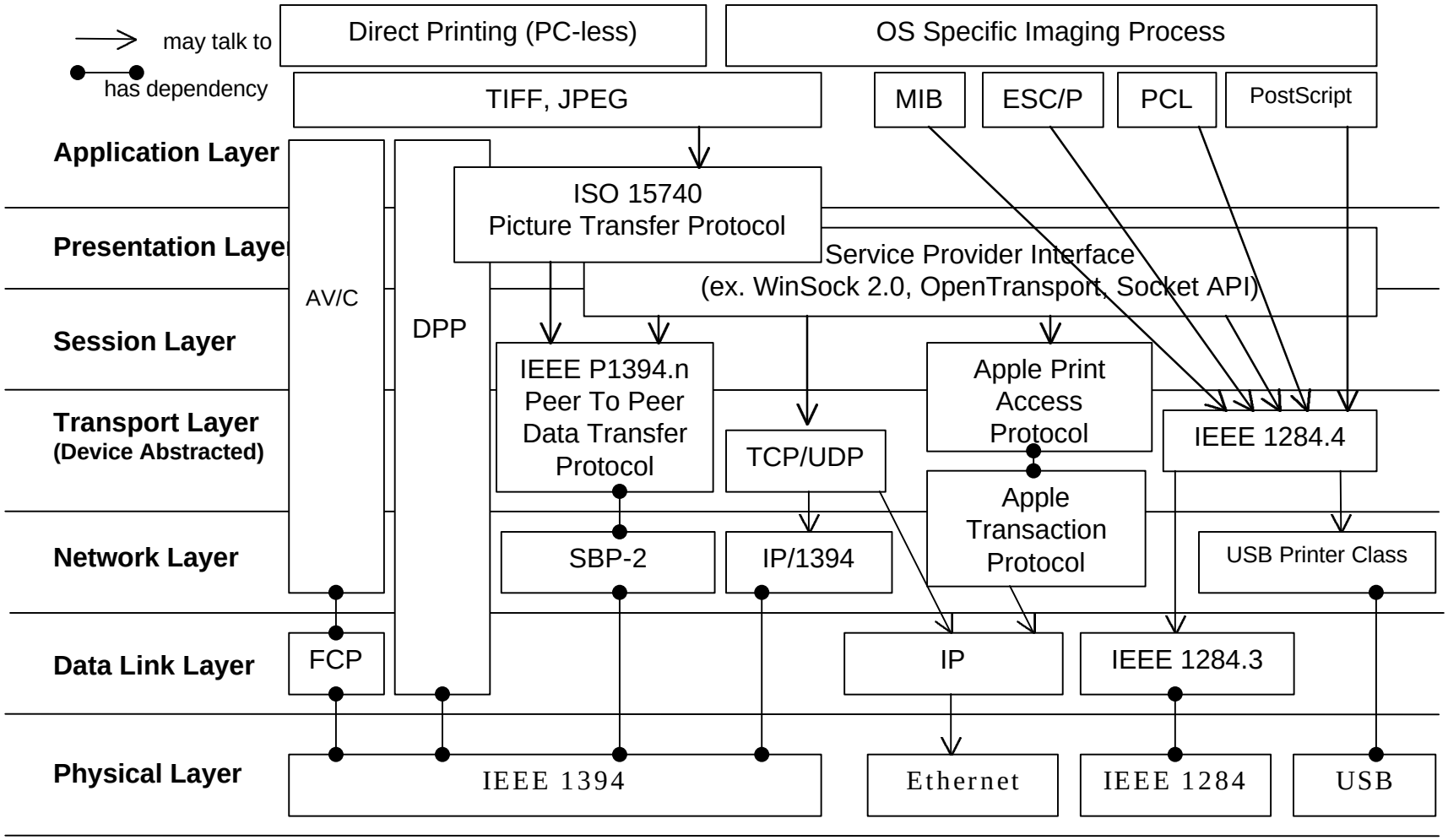


Protocol Layer (idea in 1997)



Fumio Nagasaka @ PWG meeting September 16, 1997

Protocol Layer (idea in 1999)



Fumio Nagasaka @ PWG meeting September 20, 1999

Testing requirements 1

- PC Initiator
  - PC99 or PC2001 conplient hardware
    - Windows 98 Second Edition
    - Windows 2000
  - G3/G4 Power Macintosh hardware
    - Macintosh OS 8.5 or later
  - PPDT context provided for each OS

Testing requirements 2

- PC target
  - downloadable Configuration ROM space applicable PCI 1394 board
  - IEEE 1212r compliant Configuration ROM, CSR space
  - PWG authorized PPDT server process

Testing requirements 3

- 1394 PWG standard testing application to test basic facilities of PPDT context

Thank you!

Contact me for more information

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