MS RPC Architecture & Security Problems Related

kkqq (Lin Yichong)

(kk_qq@263.net kkqq@SST, kkqq@USTC)

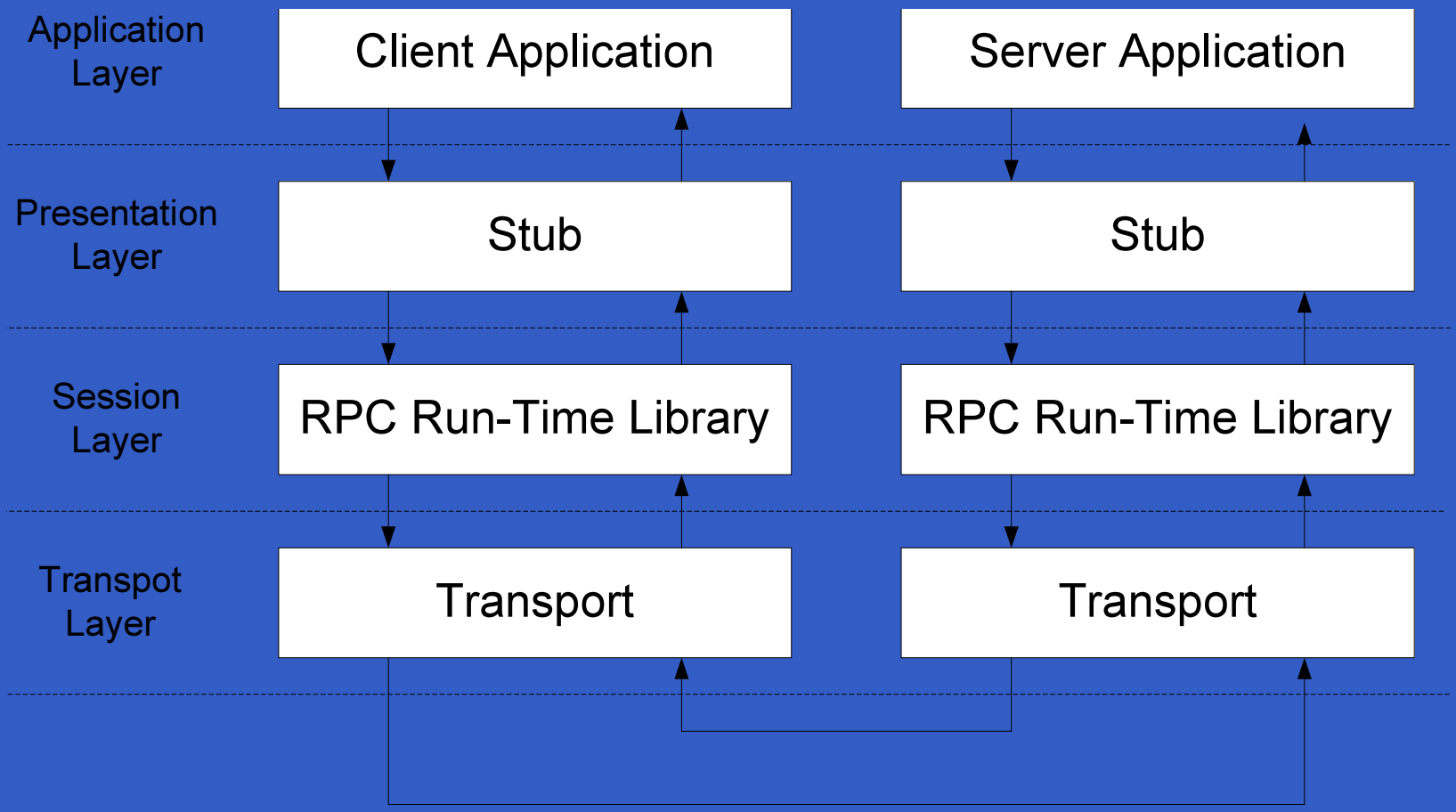
http://www.0x557.org http://kkqq.blogdns.com

Powered by LaTeX and prosper.

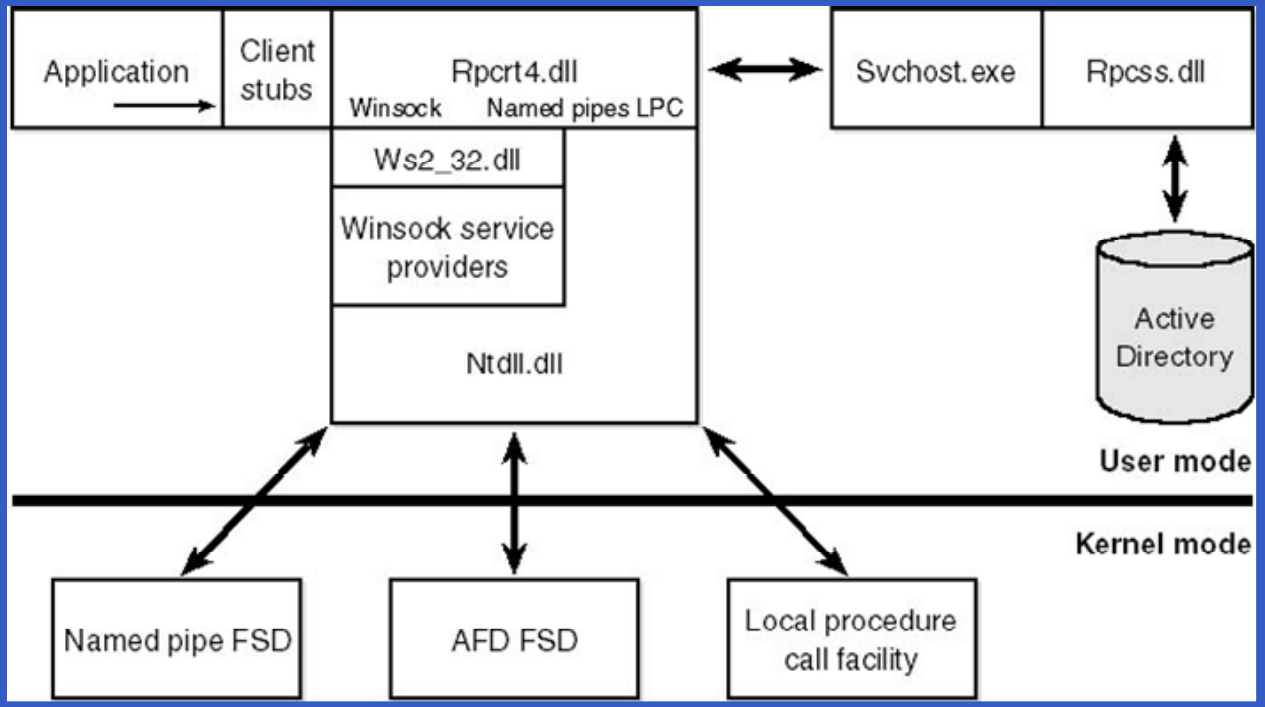
Content

- MS RPC Architecture & Data Flow
- Hacking the Binary for Fun and Profit :)
- Security Problems in MS RPC

RPC – Remote Procedure Call



RPC – Implement



From Inside win2k 3rd Edition

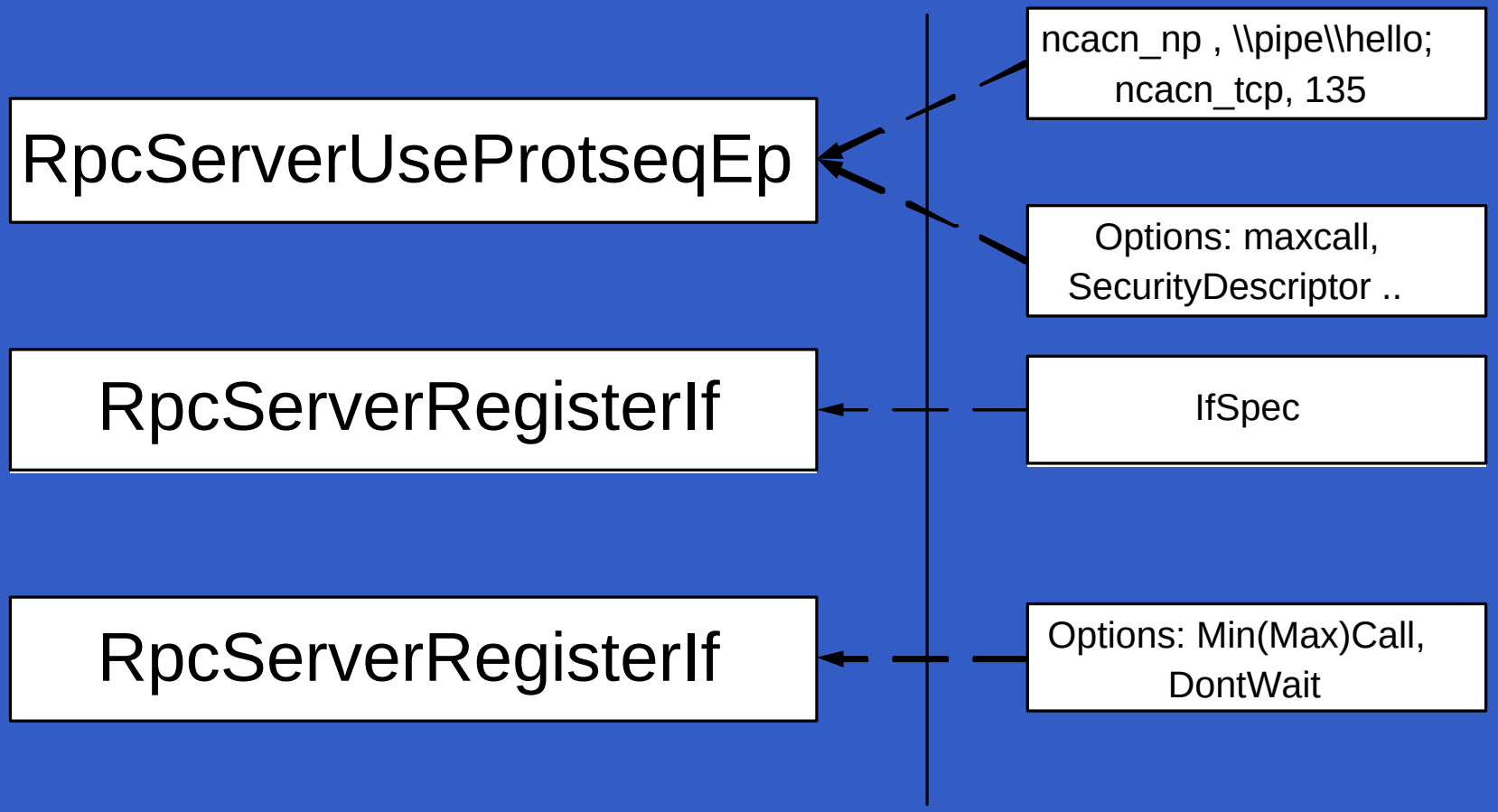
Services:

- Endpoint Mapper (135)
- Remote Management Interface (1025)

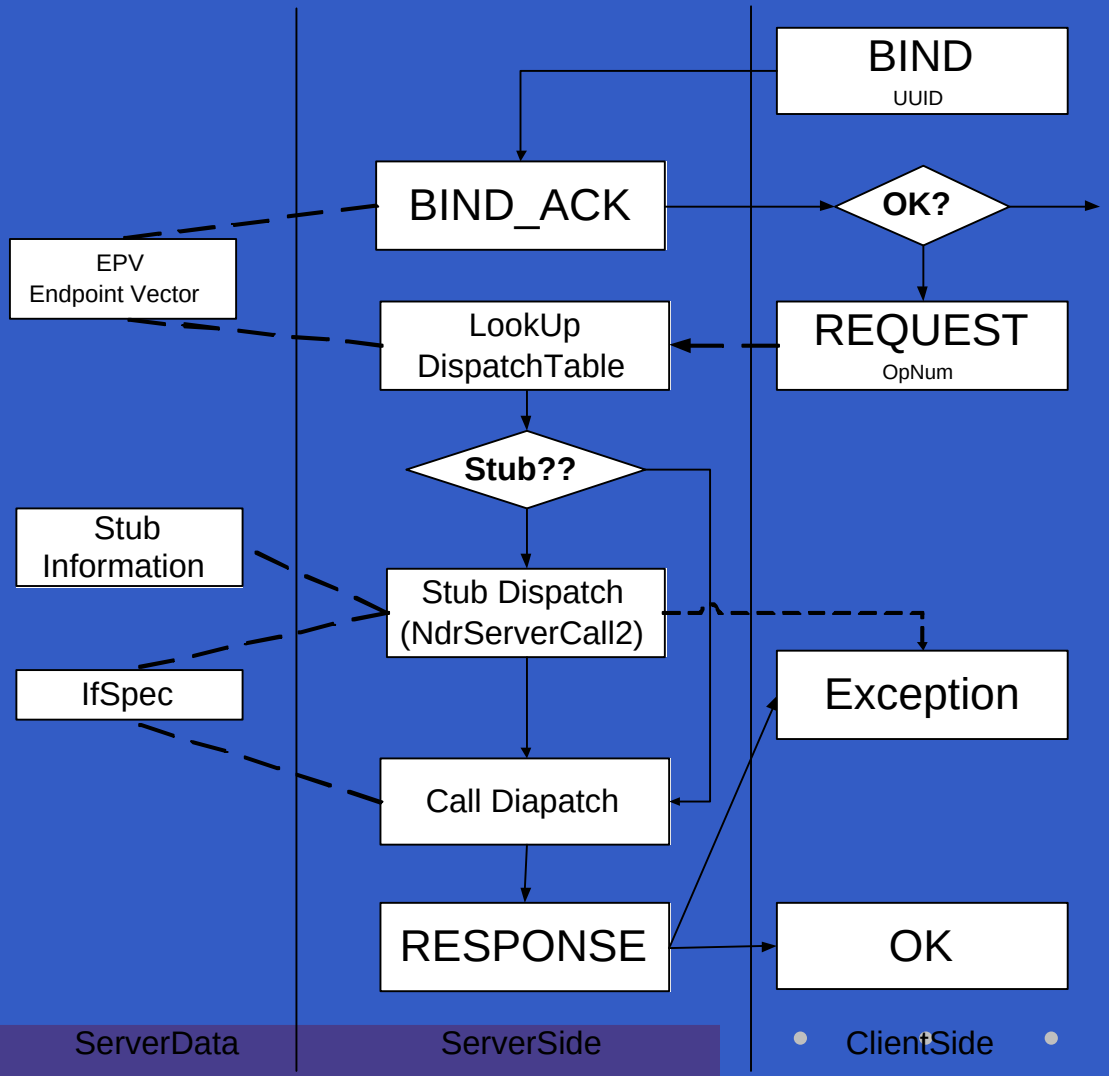
RPC – Programming

- Define the interface(.idl files)
- Generate Stub Code(midl xxx.idl)
- Implement the Interface
- Note: Endpoint
  - TCP
  - UDP
  - SMB
  - Named Pipe
  - HTTP ...

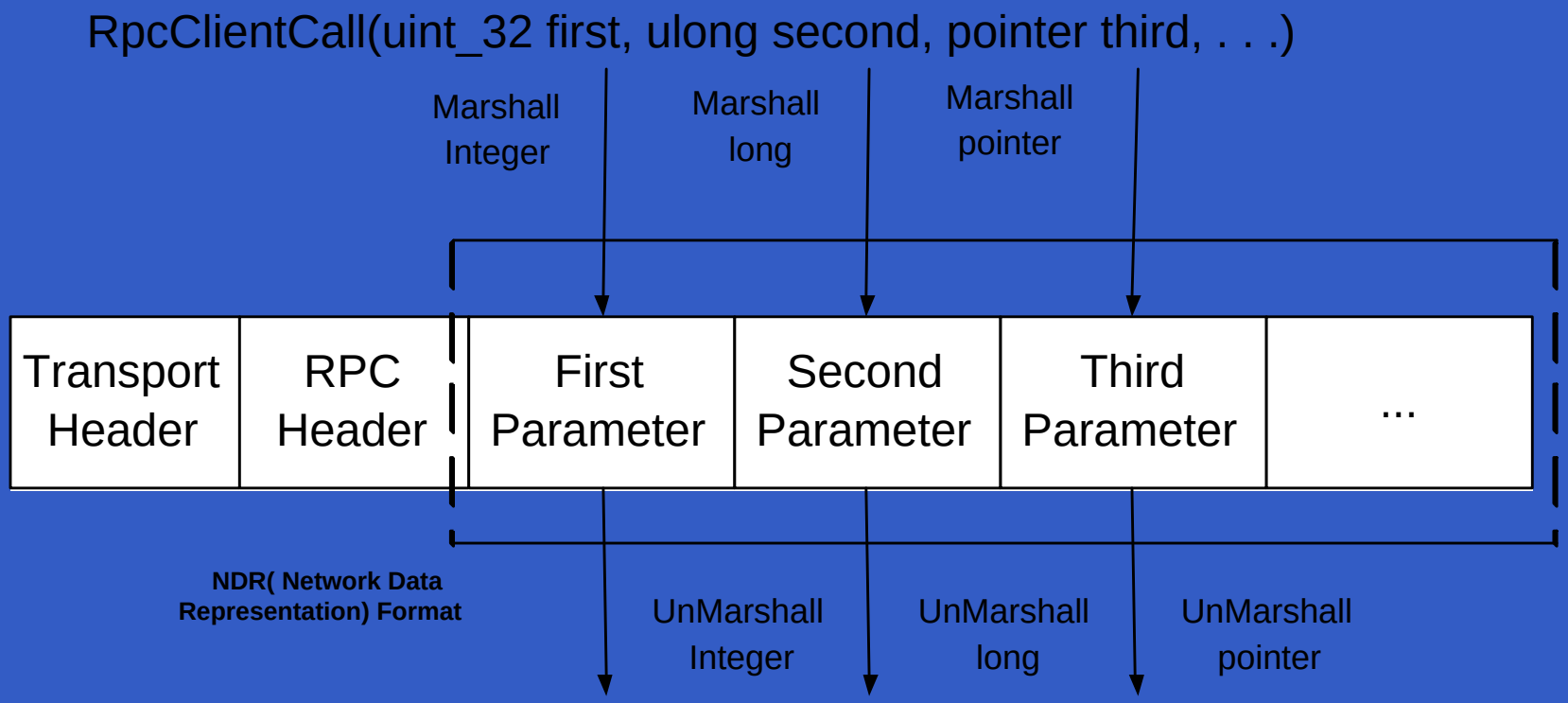
Data Flow – Server Listening



Data Flow – Call the Dispatch Routine



Data Flow – Marshall and UnMarshall



Hacking the Binary for Fun and Profit

Purpose: How the appliction dispatch different RPC request.

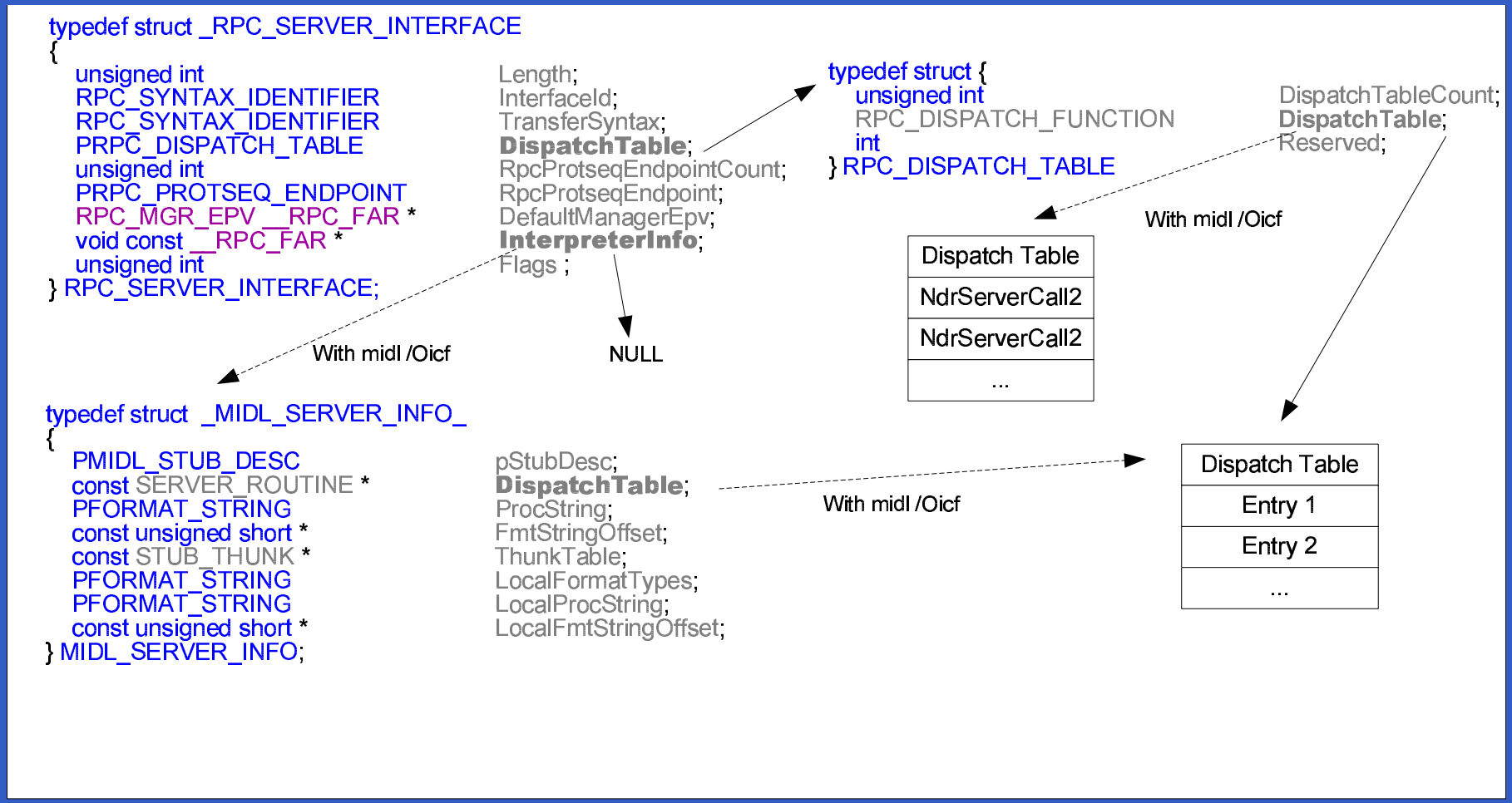
Current Problems:

- Server Application may be runned over different Endpoint.
- Find the real data flow with debugging dynamicly.

  Samples:http://www.xfocus.net/articles/200311/641.html
- Complex data-struct & and data-flow.

Our Method: IDC Script fi le

Data struct of Application Server-side



Samples: rpcss.dll – Endpoint Mapper

```
Find RpcServerRegisterIf at addr at 0x76152012
IfSpec at address 0x7615d400
Interface UUID:   e1af8308-5d1f-11c9-91a4-08002b14a0fa
Dispatch Table:   0x7615d428
    Dispatch Table Count:  7
    Dispatch Table Addr:  0x7615d408
        Entry   0: NdrServerCall2
                ...
    MIDL Server Info at address 0x761344b0
    DispatchTable:        0x76134480
        Entry   0    loc_76152A35
        Entry   1    loc_76152F30
        Entry   2    sub_7615317C
        Entry   3    sub_7615320D
        Entry   4    loc_761533C2
        Entry   5    loc_76153301
        Entry   6    loc_7615331F
```

Features

- IDC script for IDA Pro Disassembler.
- Verbose and Simple Output.
- Renaming the Dispatch Routine automaticly.

Security Problems

- DoS
- Buffer Overrun
- Information Disclosure

Catalog – Where is the vulnerability

- Server-side Application Over MS RPC
  - Messenger Service
  - IIS(Exchange Server...)...
- Implement of MS RPC Protocol
- MS RPC Services
  - EndPoint Mapper (rpcss.dll)
  - DCOM
  - Locator (locator.exe)

Server-side Appliction Over MS RPC

- Result: DoS or Priviledge Escalation
- Samples
  - Microsoft Exchange 2000 Multiple MSRPC Denial Of Service Vulnerabilities (2002 bid:5421 SPIKE 2.5)
  - Microsoft Windows Message Queuing Service Heap Overfbw Vulnerability (2003 bid:8783)
  - Microsoft Messenger Service Buffer Overrun Vulnerability (2003 bid:8826 LSD)
  - Microsoft Windows Workstation Service Remote Buffer Overfbw Vulnerability (2003 bid:9011 eeye)

Implement of MS RPC Protocol

- Result: DoS
- Samples
  - NT RPC CPU Utilization Vulnerability (1997 bid:688)
  - Microsoft Windows NT RPC DoS Vulnerability (1998 bid:2234)
  - Microsoft Windows 2000 Malformed RPC Packet DoS Vulnerability (1998 bid:1673)
  - Microsoft Windows RPC Service Denial of Service Vulnerability (2002 bid:6005 SPIKE 2.7)
  - Microsoft Malformed RPC Packet Buffer Overflow Vulnerability (2002 bid:5879)
  - Microsoft Windows 2000 RPC Service Privilege Escalation Vulnerability (2003 bid:6796 SPIKE 2.8)

MS RPC Services (1)

- Result: DoS or Priviledge Escalation
- Samples
  - Microsoft Windows NT RPC Endpoint Mapper Denial of Service Vulnerability (2001 bid:3313)
  - Microsoft Windows RPC Service Denial of Service Vulnerability (2002 bid:6005 svchost SPIKE 2.7)
  - Microsoft Windows Locator Service Buffer Overflow Vulnerability (2003 bid:6666 ngssoftware :P 6666)
  - Microsoft Windows DCOM RPC Interface Buffer Overrun Vulnerability (2003 bid:8205 LSD Blaster WORM!!)
  - Microsoft Windows RPCSS DCOM Interface Denial of Service Vulnerability (2003 bid:8234 xfocus guys)

MS RPC Services (2)

- Microsoft RPCSS DCOM Interface Long Filename Heap Corruption Vulnerability (2003 bid:8459 nsfocus)
- Microsoft RPCSS DCERPC DCOM Object Activation Packet Length Heap Corruption Vulnerability (2003 bid:5458 eeye, nsfocus etc..)
- Microsoft Windows RPCSS Multi-thread Race Condition Vulnerability (2003 bid:8811 iss)

Information from EndPoint Mapper

- DEFAULT: Open For ALL (135, 139, 445, 1025, 1026)
- rpcdump /s ip /I
- Registered Endpoint(system service)
- Endpoint Type
- /I Options (Access)
- Samples

```
ncadg_ip_udp(Datagram (connectionless) UDP/IP)
  xxx.xxx.xxx.xxx[1026] [32d90706-b698-4029-b236-e18ebff582b1]  :YES
```

Information – Active Detection

- SPIKE and rpcenum.idc
- BIND -> BIND_ACK (With Provider Rejection Error)
- A tiny program (rpcdetect.c for SPIKE)
- Samples

```
./rpcdetect xxx.xx.xx.xxx 135 e1af8308-5d1f-11c9-91a4-08002b14a03a
BIND Send OK
BIND_ACK receive
Provider rejection
Abstract syntax not supported

./rpcdetect xxx.xx.xx.xxx 135 e1af8308-5d1f-11c9-91a4-08002b14a0fa
BIND Send OK
BIND_ACK receive
```

- http://razor.bindview.com/tools/desc/rpctools1.0-readme.html
- http://www.hsc.fr/ressources/articles/win_net_srv/

Dave Aitel's SPIKE – msrpcfuzz

Advantage

- Fuzz X(string, integer...) library.
- SPK script(Test case seperated).
- Test Executor
- Various Protocol(MS RPC, SUN RPC, SMB ...)

Disadvantage

- Method (blind, fuzz, lots of useless test case)
- Exceptional Elements
- Network and *nix Host Only.

Acnowledgement

- Halvar Flake (Reverse Engineer Tools and Bugscam)
- Dave Aitel (SPIKE)
- yuange (Leading me to the Way of Automatic Security Testing)
- Inside Windows 3rd Editon
- YongQ (LaTeX and prosper)
- Members of SST (lovely guys)
- OYXin, BladeSatan, dudu... (Friends)

Thanks!

Questions?