



IBM Software Group

Troubleshooting Communication in WebSphere MQ

Rick Armstrong (rickied@us.ibm.com)

Advisory Software Engineer

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WebSphere® Support Technical Exchange

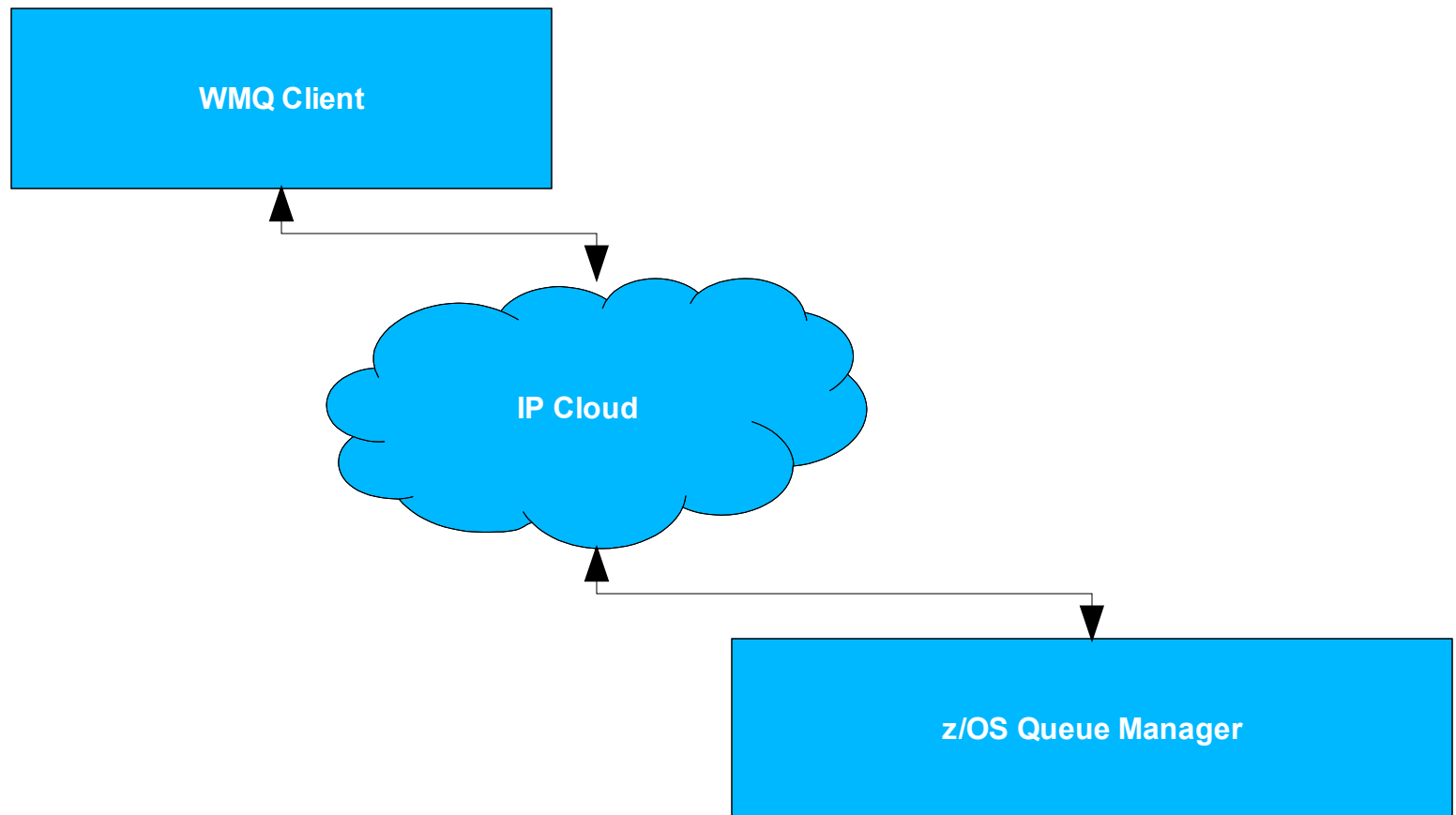


Agenda

- TCP/IP networking concepts
- Tracing at the network level
- Channel connection overview
- Common problems involving network and related layers



TCP/IP network overview



TCP/IP Sockets Overview

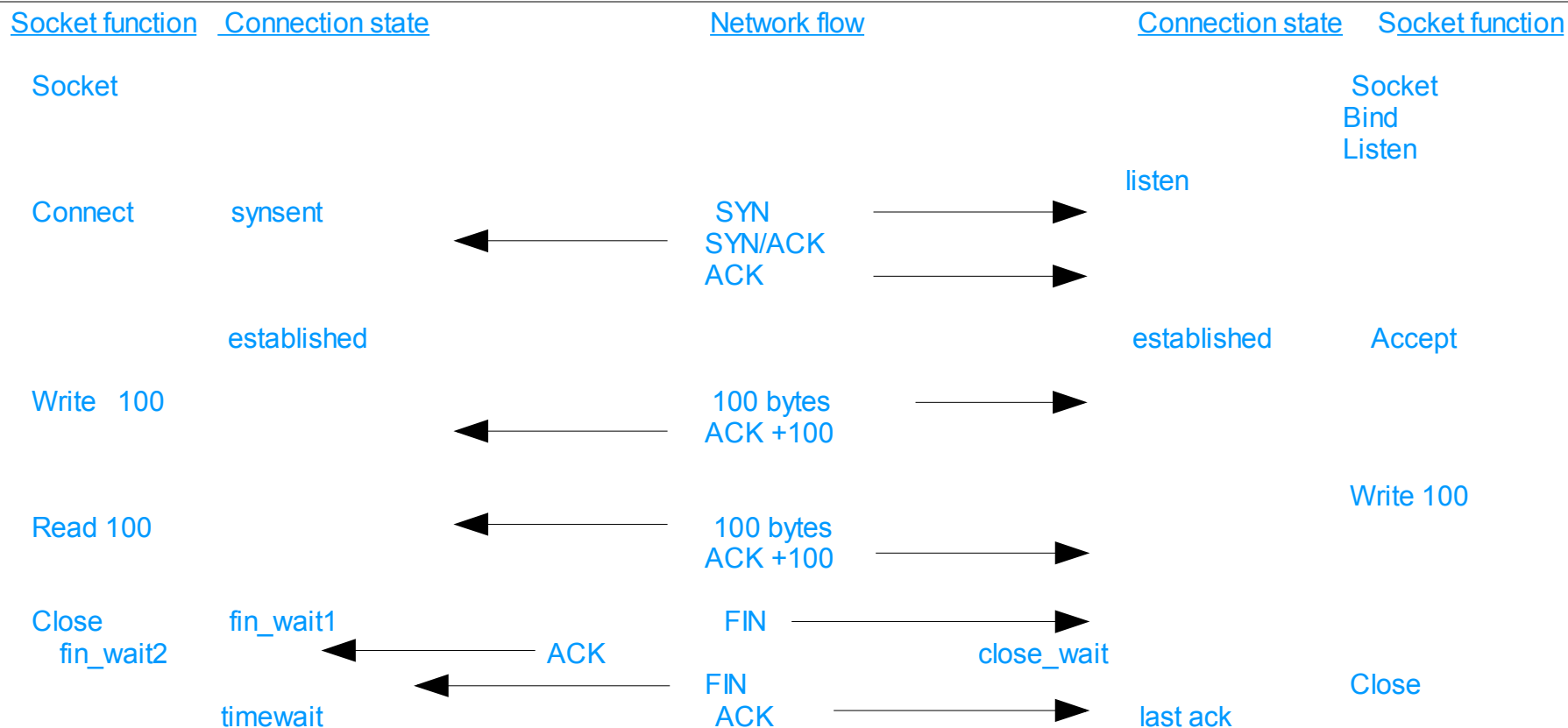
- Client
 - ▶ Connect – Allows the client to open a connection to a server's port
- Server
 - ▶ Bind – Associates a socket to a port
 - ▶ Listen – Allows clients to connect to port
 - ▶ Accept – Accepts a client connection attempt
- Client and Server
 - ▶ Socket – Allocates a socket to read and write
 - ▶ Write – Sends data on a TCP connection
 - ▶ Read – Receive data on a TCP connection
 - ▶ Close – Terminate a connection

TCP/IP socket overview

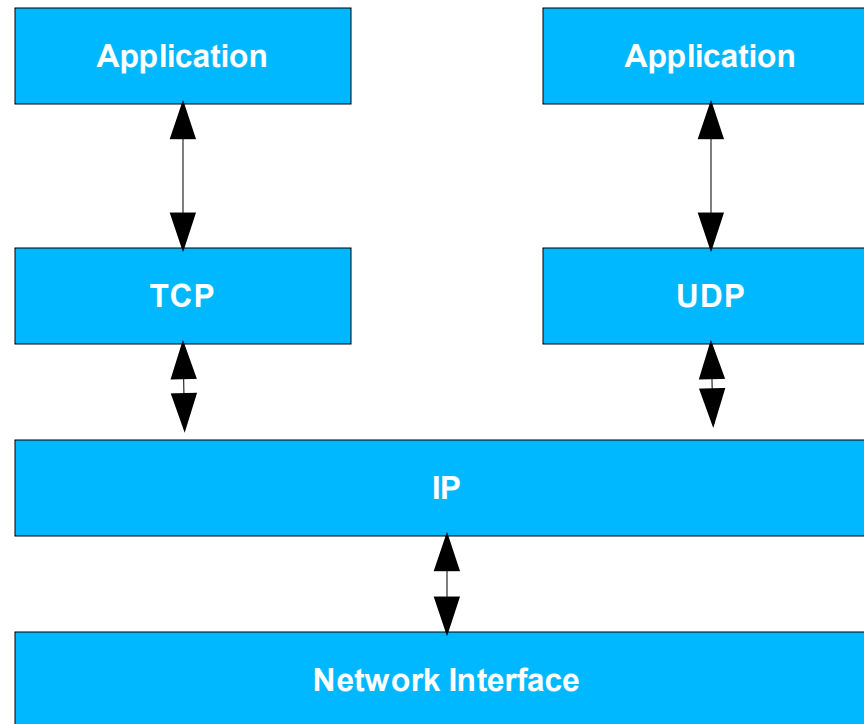
Simple example of application socket calls client/server

Client Application

Server Application



TCP/IP Stack



Gathering z/OS TCPIP packet trace

- Start the Component Trace
 - ▶ TRACE CT,ON,COMP=SYSTCPDA,SUB=(tcpip_name)
- Start TCPIP Packet Trace
 - ▶ VARY TCPIP,tcpip_name,PKT,ON,IP=xx.xx.xx.xx
- Recreate the problem
- Stop TCPIP Packet Trace
 - ▶ VARY TCPIP,tcpip_name,PKT,OFF
 - ▶ TRACE CT,OFF,COMP=SYSTCPDA,SUB=(tcpip_name)
- Dump TCPIP and TCPIP dataspace
 - ▶ DUMP COMM=('text')
 - ▶ R xx,JOBNAME=(tcpip_name),DSPNAME=('tcpip_name'.*),END
- See Technote 1292013 for additional information and options

<http://www.ibm.com/support/docview.wss?uid=swg21292013>



Examining PKTTRACE

```
406 MV23      PACKET  00000004 04:44:36.470341 Packet Trace
From Interface : GE1           Device: QDIO Ethernet  Full=48
Tod Clock      : 2010/10/06 04:44:36.470339  Intfx: 9
Segment #     : 0             Flags:  In
Source        : 9.37.245.161
Destination   : 9.20.122.71
Source Port   : 3165          Dest Port: 1601  Asid: 009D TCB: 00000000
```

This is a summary of the packet to follow

Examining PKTTRACE

IpHeader: Version : 4 Header Length: 20
Tos : 00 QOS: Routine Normal Service
Packet Length : 48 ID Number: 79F8
Fragment : DontFragment Offset: 0
TTL : 116 Protocol: TCP CheckSum: 0AAE FFFF
Source : **9.37.245.161**
Destination : **9.20.122.71**

TCP

Source Port : **3165** () **Destination Port:** **1601** ()
Sequence Number : 934128578 Ack Number: 0
Header Length : 28 **Flags: Syn**
Window Size : 65535 CheckSum: 0E41 FFFF Urgent Data Pointer: 0000
Option : Max Seg Size Len: 4 MSS: 1380
Option : NOP
Option : NOP
Option : NOP
Option : NOP

Examining PKTTRACE

```
IpHeader: Version : 4
Tos : 00
Packet Length : 44
Fragment :
TTL : 64
Source : 9.20.122.71
Destination : 9.37.245.161
Header Length: 20
QOS: Routine Normal Service
ID Number: 7969
Offset: 0
Protocol: TCP
Checksum: 0000 80BE
```

TCP

```
Source Port : 1601 ()
Sequence Number : 3418421524
Header Length : 24
Window Size : 32768
Option : Max Seg Size
Destination Port: 3165 ()
Ack Number: 934128579
Flags: Ack Syn
Checksum: 8240 A72C Urgent Data Pointer: 0000
Len: 4 MSS: 1456
```

Examining PKTTRACE

```
IpHeader: Version : 4                Header Length: 20
  Tos              : 00                QOS: Routine Normal Service
  Packet Length   : 40                ID Number: 79F9
  Fragment        : DontFragment      Offset: 0
  TTL             : 116                Protocol: TCP                CheckSum: 0AB5 FFFF
  Source         : 9.37.245.161
  Destination  : 9.20.122.71
```

TCP

```
Source Port    : 3165  ()          Destination Port: 1601  ()
Sequence Number  : 934128579          Ack Number: 3418421525
Header Length    : 20                  Flags: Ack
Window Size      : 65535               CheckSum: 72CD FFFF Urgent Data Pointer: 0000
```

TCP 3-way handshake is finished at this point and the TCP connection is in established state

Examining PKTTRACE

```
IpHeader: Version : 4                Header Length: 20
  Tos              : 00                QOS: Routine Normal Service
  Packet Length  : 276             ID Number: 79FA
  Fragment        : DontFragment      Offset: 0
  TTL             : 116                Protocol: TCP                CheckSum: 09C8 FFFF
  Source          : 9.37.245.161
  Destination     : 9.20.122.71
```

```
TCP
  Source Port     : 3165  ()           Destination Port: 1601  ()
  Sequence Number : 934128579         Ack Number: 3418421525
  Header Length   : 20                Flags: Ack Psh
  Window Size     : 65535              CheckSum: 87AF FFFF Urgent Data Pointer: 0000
```

Continue on the next slide

Examining PKTTRACE

```

Ip Header           : 20                IP: 9.37.245.161, 9.20.122.71 Offset: 0
000000 45000114 79FA4000 740609C8 0925F5A1 09147A47
Protocol Header    : 20                Port: 3165, 1601      Offset: 14
000000 0C5D0641 37ADABC3 CBC0F915 5018FFFF 87AF0000
Data              : 236                Data Length: 236   Offset: 28
000000 54534820 000000EC 02010100 00000000 | ..... TSH ..... |
000010 00000000 22020000 B5010000 49442020 | ..... ".....ID |
000020 0A070000 00003200 F67F0000 00004000 | .....6"..... .2.....@. |
000030 FFC99A3B 5249434B 2E544F2E 52545048 | .I.....|...&. ...;RICK.TO.RTPH|
000040 20202020 20202020 8700B501 514D5F49 | .....g....(¬. ....QM_I |
000050 424D5F39 45443433 41434635 32322020 | .(¬..... BM_9ED43ACF522 |
000060 20202020 20202020 20202020 20202020 | ..... |
000070 20202020 20202020 20202020 2C010000 | ..... ,... |
000080 6A000000 00FF00FF FFFFFFFF FFFFFFFF | ..... j..... |
000090 FFFFFFFF FFFF0000 00000000 00000000 | ..... |
0000A0 01000000 F40E0000 01000000 01000000 | ....4..... |
0000B0 4D514D4D 30373030 30313032 514D5F49 | (.((.....(¬. MQMM07000102QM_I |
0000C0 424D5F39 45443433 41434635 32325F32 | .(¬.....¬. BM_9ED43ACF522_2 |
0000D0 3031302D 30372D31 335F3138 2E32312E | .....¬..... 010-07-13_18.21. |
0000E0 32332020 20202020 20202020 | ..... 23 |

```

This is the initial data from the client initiating communication over the channel

Examining PKTTRACE

```
IpHeader: Version : 4                Header Length: 20
  Tos              : 00                QOS: Routine Normal Service
  Packet Length   : 276               ID Number: 796A
  Fragment        :                    Offset: 0
  TTL             : 64                Protocol: TCP                CheckSum: 0000 81A7
  Source          : 9.20.122.71
  Destination     : 9.37.245.161

TCP
  Source Port     : 1601  ()           Destination Port: 3165  ()
  Sequence Number : 3418421525        Ack Number: 934128815
  Header Length   : 20                Flags: Ack Psh
  Window Size     : 32532             CheckSum: 8328 4CC0 Urgent Data Pointer: 0000
```

Continue on the next slide

Examining PKTTRACE

```

Ip Header          : 20                IP: 9.20.122.71, 9.37.245.161 Offset: 0
000000 45000114 796A0000 40060000 09147A47 0925F5A1
Protocol Header    : 20                Port: 1601, 3165                Offset: 14
000000 06410C5D CBC0F915 37ADACAF 50187F14 83280000
Data              : 236                Data Length: 236                Offset: 28
000000 54534820 000000EC 02010200 00000000 |..... TSH .....|
000010 00000000 22020000 B5010000 49442020 |..... ".....ID |
000020 08070008 00003200 F67F0000 00004000 |.....6"..... .2.....@.|
000030 FFC99A3B 5249434B 2E544F2E 52545048 |.I.....|...&. ...;RICK.TO.RTPH|
000040 20202020 20202020 8601F401 52545048 |.....f.4...&. ....RTPH|
000050 20202020 20202020 20202020 20202020 |.....|
000060 to 00006F (X'000010' bytes) -- All bytes contain X'20'
000070 20202020 20202020 20202020 2C010000 |.....,....|
000080 00000000 00FF00FF FFFFFFFF FFFFFFFF |.....|
000090 FFFFFFFF FFFF0000 00000000 00000000 |.....|
0000A0 01000000 F40E0000 01000000 01000000 |....4.....|
0000B0 4D514D4D 30373030 30313032 514D5F49 |(.((.....(¬. MQMM07000102QM_I|
0000C0 424D5F39 45443433 41434635 32325F32 |.(¬.....¬. BM_9ED43ACF522_2|
0000D0 3031302D 30372D31 335F3138 2E32312E |.....¬..... 010-07-13_18.21.|
0000E0 32332020 20202020 20202020 |..... 23 |
    
```

This is reply from the CHIN MCA



Let's do a little math

The client sent data (236 bytes) with a TCP sequence number = 934128579

The SRVCONN sent data with a TCP ACK number = 934128815

$$\begin{array}{r} \text{ACK} - 934128815 \\ - \\ \text{SEQ} - 934128579 \\ \hline = 236 \end{array}$$

This is how you can ensure that TCP is receiving the data sent (i.e. via the Sequence and Ack numbers!

Examining PKTTRACE

```

Ip Header           : 20                IP: 9.37.245.161, 9.20.122.71 Offset: 0
000000 450000C4 79FB4000 74060A17 0925F5A1 09147A47
Protocol Header    : 20                Port: 3165, 1601           Offset: 14
000000 0C5D0641 37ADACAF CBC0FA01 5018FF13 15E00000
Data               : 156              Data Length: 156         Offset: 28
000000 54534820 0000009C 02010100 00000000 |..... TSH .....|
000010 00000000 22020000 B5010000 49442020 |..... ".....ID |
000020 08070000 00003200 F67F0000 00004000 |.....6"..... .2.....@.|
000030 FFC99A3B 5249434B 2E544F2E 52545048 |.I.....|...&. ...;RICK.TO.RTPH|
000040 20202020 20202020 8600B501 514D5F49 |.....f.... (-. ....QM_I|
000050 424D5F39 45443433 41434635 32322020 |. (-..... BM_9ED43ACF522 |
000060 20202020 20202020 20202020 20202020 |..... |
000070 20202020 20202020 20202020 2C010000 |..... ,...|
000080 6A000000 00FF00FF FFFFFFFF FFFFFFFF |..... j.....|
000090 FFFFFFFF FFFF0000 00000000 |..... |
    
```

More negotiation of the channel MCA from the client



Examining PKTTRACE

```

Ip Header          : 20                IP: 9.20.122.71, 9.37.245.161 Offset: 0
000000 450000C4 796B0000 40060000 09147A47 0925F5A1
Protocol Header   : 20                Port: 1601, 3165                Offset: 14
000000 06410C5D CBC0FA01 37ADAD4B 50187F64 82D80000
Data              : 156                Data Length: 156                Offset: 28
000000 54534820 0000009C 02010000 00000000 |..... TSH .....|
000010 00000000 11030000 B5010000 49442020 |..... ID |
000020 08070000 00003200 F67F0000 00004000 |.....6".... . ....2.....@.|
000030 FFC99A3B 5249434B 2E544F2E 52545048 |.I.....|...&. ...;RICK.TO.RTPH|
000040 20202020 20202020 8600F401 52545048 |.....f.4...&. ....RTPH|
000050 20202020 20202020 20202020 20202020 |..... |
000060 to 00006F (X'000010' bytes) -- All bytes contain X'20'
000070 20202020 20202020 20202020 2C010000 |..... ,...|
000080 00000000 00FF00FF FFFFFFFF FFFFFFFF |..... |
000090 FFFFFFFF FFFF0000 00000000 |..... |
    
```

More negotiation of the SRVCONN channel MCA



Examining PKTTRACE

```

Ip Header          : 20                IP: 9.37.245.161, 9.20.122.71 Offset: 0
000000 45000229 79FC4000 740608B1 0925F5A1 09147A47
Protocol Header    : 20                Port: 3165, 1601          Offset: 14
000000 0C5D0641 37ADAD4B CBC0FA9D 5018FE77 484D0000
Data              : 513                Data Length: 513      Offset: 28
000000 54534820 00000201 02043000 1F83AA4C | .....c.< TSH .....0....L|
000010 10000301 22020000 B5010000 4D534820 | .....( ... ..".....MSH |
000020 01000000 25000000 00000000 D1010000 | .....J... ..%.....|
000030 58514820 01000000 4C415552 412E514C | .....<.....< XQH ....LAURA.QL|
000040 20202020 20202020 20202020 20202020 | .....|
000050 to 00005F (X'000010' bytes) -- All bytes contain X'20'
000060 20202020 20202020 52545048 20202020 | .....&..... RTPH |
000070 20202020 20202020 20202020 20202020 | .....|
000080 to 00008F (X'000010' bytes) -- All bytes contain X'20'
000090 20202020 20202020 4D442020 01000000 | .....(..... MD ....|
0000A0 00000000 08000000 FFFFFFFF 00000000 | .....|
0000B0 22020000 B8040000 4D515354 52202020 | .....(..... ".....MQSTR |
0000C0 00000000 00000000 414D5120 514D5F49 | .....(.....(.....AMQ QM_I |
0000D0 424D5F39 45443433 2583AA4C 20007902 | ..(.....c.<..`. BM_9ED43%..L .y. |
0000E0 00000000 00000000 00000000 00000000 | .....|
0000F0 00000000 00000000 00000000 20202020 | .....|

```

Continue to the next slide

Examining PKTTRACE

```

000100 20202020 20202020 20202020 20202020 |.....|
000110 to 00011F (X'000010' bytes) -- All bytes contain X'20'
000120 20202020 20202020 20202020 514D5F49 |.....(Q_M_I|
000130 424D5F39 45443433 41434635 32322020 |.(.....BM_9ED43ACF522|
000140 20202020 20202020 20202020 20202020 |.....|
000150 20202020 20202020 20202020 4C415552 |.....<...LAUR|
000160 414E4554 54452020 16010515 000000BA |+......ANETTE .....|
000170 1E06D260 3C351488 5EDBC2F4 01000000 |..K-...h;.B4....<5.....|
000180 00000000 0000000B 20202020 20202020 |.....|
000190 20202020 20202020 20202020 20202020 |.....|
0001A0 20202020 20202020 0B000000 7265204D |.....(.....re M|
0001B0 515C6A61 76615C6A 72655C62 696E5C6A |.*././*...*..>*. Q\java\jre\bin\j|
0001C0 61766177 2E657865 32303130 31303036 |/./..... avaw.exe20101006|
0001D0 30343434 32323436 20202020 54686973 |..... 04442246 This|
0001E0 20697320 74657374 206D6573 73616765 |....._.../.. is test message|
0001F0 20332066 6F722074 68652057 5354452E |....?..... 3 for the WSTE.|
000200 20 |. |

```

This packet contains the actual message sent from the client.

Examining PKTTRACE

```
IpHeader: Version : 4                Header Length: 20
  Tos              : 00                QOS: Routine Normal Service
  Packet Length   : 40                ID Number: 796C
  Fragment        :                    Offset: 0
  TTL             : 64                Protocol: TCP                CheckSum: 0000 80BD
  Source          : 9.20.122.71
  Destination     : 9.37.245.161
```

```
TCP
  Source Port      : 1601 ()          Destination Port: 3165 ()
  Sequence Number  : 3418421917      Ack Number: 934129484
  Header Length    : 20              Flags: Ack Psh
  Window Size      : 32255           CheckSum: 823C 9287 Urgent Data Pointer: 0000
```

This is the acknowledgement from z/OS TCPIP that the message data arrived. Notice the Ack number. The previous Seq number was $934128971 + 513 = 934129484$

Again, we know that TCPIP on z/OS got the data sent from the client.

Examining PKTTRACE

```

Ip Header          : 20                IP: 9.37.245.161, 9.20.122.71 Offset: 0
000000 45000044 79FD4000 74060A95 0925F5A1 09147A47
Protocol Header    : 20                Port: 3165, 1601          Offset: 14
000000 0C5D0641 37ADAF4C CBC0FA9D 5018FE77 1BB70000
Data              : 28                Data Length: 28         Offset: 28
000000 54534820 0000001C 02050100 1F83AA4C |.....c.< TSH .....L|
000010 10000301 22020000 B5010000 |.....          ...."..... |

```

Client MCA doing a status check

Examining PKTTRACE

```

Ip Header      : 20                IP: 9.20.122.71, 9.37.245.161 Offset: 0
000000 45000044 796D0000 40060000 09147A47 0925F5A1
Protocol Header : 20                Port: 1601, 3165           Offset: 14
000000 06410C5D CBC0FA9D 37ADAF68 50187FE4 82580000
Data          : 28                Data Length: 28           Offset: 28
000000 54534820 0000001C 02050000 00000000 |..... TSH .....|
000010 00000000 11030000 B5010000 |..... |

```

SRVCONN replying....I'm OK

Examining PKTTRACE

```

Ip Header      : 20          IP: 9.37.245.161, 9.20.122.71 Offset: 0
000000 45000044 7A094000 74060A89 0925F5A1 09147A47
Protocol Header : 20          Port: 3165, 1601      Offset: 14
000000 0C5D0641 37ADAF68 CBC0FAB9 5018FE5B F16B0000
Data           : 28          Data Length: 28      Offset: 28
000000 54534820 0000001C 02050800 00000000 |..... TSH .....|
000010 00000000 22020000 B5010000 |.....  ....".....|

```

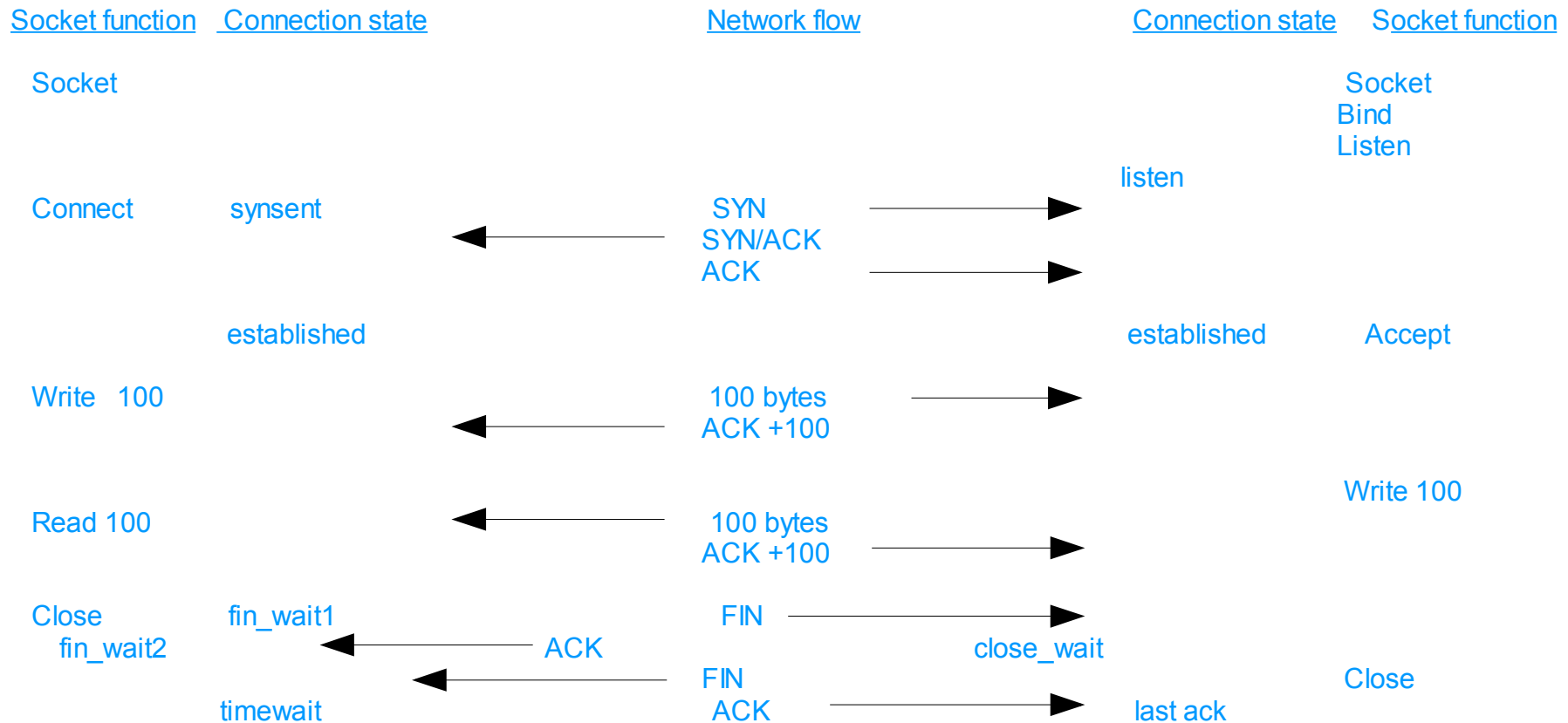
Client saying I'm done and closing the channel

TCP/IP socket overview

Simple example of application socket calls client/server

Client Application

Server Application



Examining PKTTRACE

```
IpHeader: Version : 4                Header Length: 20
  Tos              : 00                QOS: Routine Normal Service
  Packet Length   : 40                ID Number: 7A0A
  Fragment        : DontFragment      Offset: 0
  TTL             : 116               Protocol: TCP                CheckSum: 0AA4 FFFF
  Source          : 9.37.245.161
  Destination     : 9.20.122.71

TCP
  Source Port     : 3165  ()          Destination Port: 1601  ()
  Sequence Number : 934129540        Ack Number: 3418421945
  Header Length   : 20                Flags: Ack Fin
  Window Size     : 65115             CheckSum: 6F0B FFFF Urgent Data Pointer: 0000
```

Client WMQ code has issued a close() for the socket. TCP is sending a packet with the Fin flag on.

Examining PKTTRACE

```
IpHeader: Version : 4                Header Length: 20
  Tos              : 00                QOS: Routine Normal Service
  Packet Length   : 40                ID Number: 7981
  Fragment        :                   Offset: 0
  TTL             : 64                Protocol: TCP                CheckSum: 0000 80D2
  Source          : 9.20.122.71
  Destination     : 9.37.245.161

TCP
  Source Port     : 1601  ()          Destination Port: 3165  ()
  Sequence Number : 3418421945       Ack Number: 934129541
  Header Length   : 20               Flags: Ack Psh
  Window Size     : 32740            CheckSum: 823C 94C1 Urgent Data Pointer: 0000
```

Fin acked by z/OS

Examining PKTTRACE

```
IpHeader: Version : 4                Header Length: 20
  Tos              : 00                QOS: Routine Normal Service
  Packet Length   : 40                ID Number: 7982
  Fragment        :                    Offset: 0
  TTL             : 64                Protocol: TCP                CheckSum: 0000 80D3
  Source          : 9.20.122.71
  Destination     : 9.37.245.161

TCP
  Source Port     : 1601  ()          Destination Port: 3165  ()
  Sequence Number : 3418421945       Ack Number: 934129541
  Header Length   : 20                Flags: Ack Psh Fin
  Window Size     : 32740             CheckSum: 823C 94C2 Urgent Data Pointer: 0000
```

CHIN has issued a close on behalf of the SRVCONN because the client closed. Therefore a Fin flows from z/OS.

Examining PKTTRACE

```
IpHeader: Version : 4           Header Length: 20
  Tos              : 00         QOS: Routine Normal Service
  Packet Length   : 40         ID Number: 7A0B
  Fragment        : DontFragment Offset: 0
  TTL             : 116        Protocol: TCP           CheckSum: 0AA3 FFFF
  Source          : 9.37.245.161
  Destination     : 9.20.122.71
```

```
TCP
  Source Port      : 3165  ()   Destination Port: 1601  ()
  Sequence Number  : 934129541 Ack Number: 3418421946
  Header Length    : 20        Flags: Ack
  Window Size      : 65115     CheckSum: 6F0A FFFF Urgent Data Pointer: 0000
```

Fin acked by client TCP stack.

Examining PKTTRACE (SESS output)

TcpHdr	IO	F	Seq	Ack	RcvWnd	Data	Delta	Time	TimeStamp
	S	I	934128578	0	65535	0	0.000000		04:44:36.470341
A	S	O	3418421524	934128579	32768	0	0.000086		04:44:36.470427
A	I	u	934128579	3418421525	65535	0	0.089765		04:44:36.560192
AP	I	.	934128579	3418421525	65535	236	0.000633		04:44:36.560825
AP	O	+	3418421525	934128815	32532	236	0.003770		04:44:36.564595
AP	I	+	934128815	3418421761	65299	156	0.090278		04:44:36.654873
AP	O	+	3418421761	934128971	32612	156	0.000389		04:44:36.655262
AP	I	+	934128971	3418421917	65143	513	0.096111		04:44:36.751373
AP	O	d	3418421917	934129484	32255	0	0.225455		04:44:36.976828
AP	I	.	934129484	3418421917	65143	28	0.773637		04:44:37.750465
AP	O	+	3418421917	934129512	32740	28	0.000494		04:44:37.750959
A	I	d	934129512	3418421945	65115	0	0.285407		04:44:38.036366
AP	I	.	934129512	3418421945	65115	28	38.419387		04:45:16.455753
A	F	I	? 934129540	3418421945	65115	0	0.000005		04:45:16.455758
AP	O	a	3418421945	934129541	32740	0	0.000094		04:45:16.455852
AP	F	O	? 3418421945	934129541	32740	0	0.000609		04:45:16.456461
A	I	a	934129541	3418421946	65115	0	0.089482		04:45:16.545943

Domain Nameserver issues

- CSQX014E +RTPH CSQXSRSP Listener exceeded channel limit, TRPTYPE=TCP INDISP=QMGR.
- DISPLAY CHSTATUS(*) STATUS SUBSTATE

▶ CSQM422I RTPH

CHSTATUS(TEST.CHAN)

CHLDISP(PRIVATE)

CONNNAME(9.37.245.161)

CURRENT

CHLTYPE(RCVR)

STATUS(BINDING)

SUBSTATE(NAMESERVER)

LSTMSGTI()

LSTMSGDA()

MSGS(0)

Domain Nameserver issues

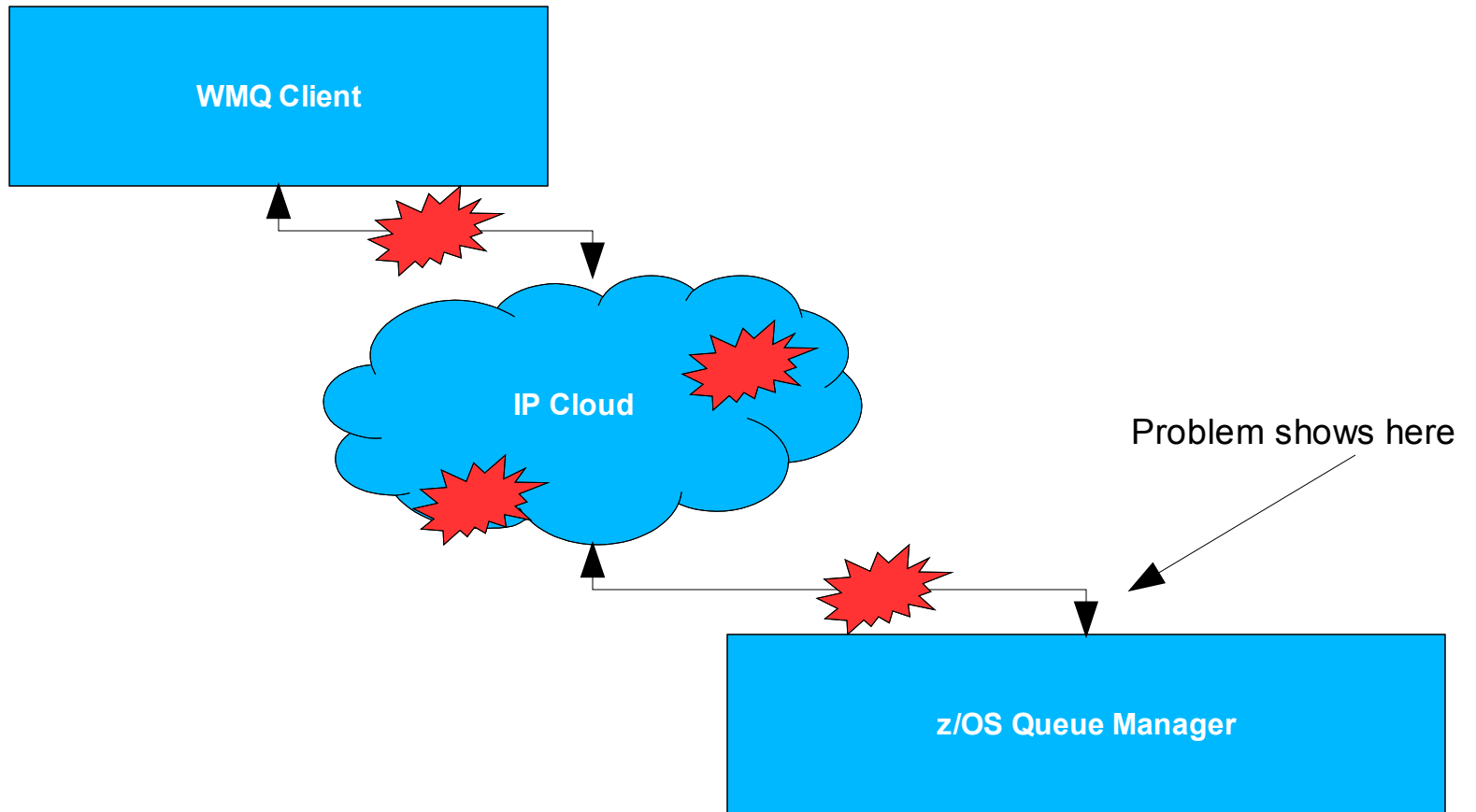
- CHIN will attempt a getnameinfo() call to associate client IP address to a hostname
- Delays in DNS response can cause CSQX014E and other problems
- Task is single threaded

- This is a DNS problem...
- Check Resolver settings to see what DNS(s) are configured
- Check RESOLVERTIMEOUT setting. 30 sec default
- Bypass
 - ▶ V6 – PK79874/UK47580
 - ▶ V7 – PK88882/UK47582
 - Requires Service parm

Channel connection reset

- +CSQX208E +RTPH CSQXRESP Error receiving data,
channel TEST.CHAN, connection 9.1.1.1 (9.1.1.1) (queue manager ?????) TRPTYPE=TCP RC=00000461 (ECONNRESET) reason=00000000
- CSQX206E RTPH CSQXRCTL Error sending data, channel TEST.CHAN, connection raleigh (9.1.1.1) (queue manager RTPH) TRPTYPE=TCP RC=0000008C reason=76697242
 - ▶ 76697242 = JRCONNTCBNOTFOUND

Channel connection reset



Channel connection reset

- The problem is reported on z/OS
 - The reset is not generated from the reporting host channel
 - The reset could come from the other host
 - The reset could come from any intermediate firewalls
-
- May need to trace on both sides of the channel connection
 - May need to trace intermediate hops along the connection

Summary

- TCP/IP networking concepts
- How to trace at the network level
- Reviewed a Client channel connection via PKTTRACE
- Reviewed some common network related problems

Additional WebSphere Product Resources

- Learn about upcoming WebSphere Support Technical Exchange webcasts, and access previously recorded presentations at:
http://www.ibm.com/software/websphere/support/supp_tech.html
- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at:
<http://www.ibm.com/developerworks/websphere/community/>
- Join the Global WebSphere Community:
<http://www.websphereusergroup.org>
- Access key product show-me demos and tutorials by visiting IBM® Education Assistant:
<http://www.ibm.com/software/info/education/assistant>
- View a webcast replay with step-by-step instructions for using the Service Request (SR) tool for submitting problems electronically:
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