

带XOT Keepalive的基于TCP/IP的x25

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简介

X.25 over TCP (XOT)使您发送在TCP/IP网络的X.25数据包而不是链路接入过程，平衡式(LAPB)链路。XOT也允许您通过IP网络以隧道传输X.25流量。

在X.25链路和TCP连接之间的Cisco IOS软件交换机X.25数据包。每虚拟电路目的地目标地址可以被映射对一个分开的IP地址。XOT Keepalive可以用于检测层下TCP。TCP有能力通过检查确认序号检测连接。如果它不接收其中任一确认数据包，保持unack数据包并且继续尝试重新传输，直到最终放弃并且切断TCP连接。然而，此进程花费时间。

本文描述如何使用XOT保活功能，在TCP连接是残破的情况下，检测它，并且采取更加快速的行动。

先决条件

要求

本文档没有任何特定的要求。

使用的组件

本文档中的信息基于以下软件和硬件版本：

- Cisco IOS软件版本9.21或以上，与任何特性组
- 有Cisco IOS软件版本9.21或以上支持的任何Cisco路由器此功能
- Cisco IOS软件版本12.2(13)T13和12.2(27)

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

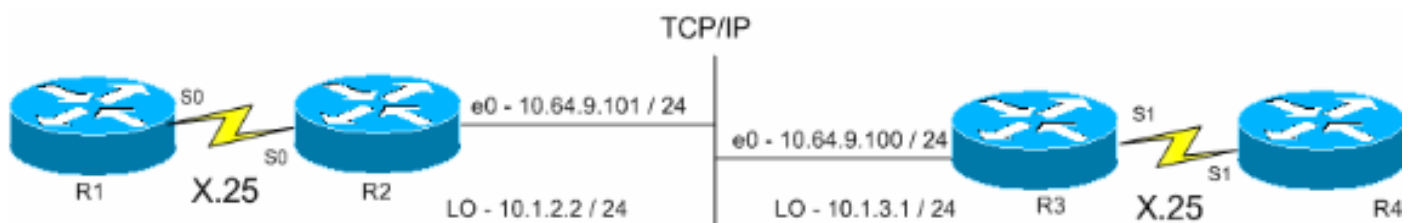
配置

本部分提供有关如何配置本文档所述功能的信息。

注意：有关本文档所用命令的详细信息，请使用[命令查找工具](#)（[仅限注册用户](#)）。

网络图

本文档使用以下网络设置：



配置

本文档使用以下配置：

- [R1 \(Cisco 2500路由器\)](#)
- [R2 \(Cisco 2500路由器\)](#)
- [R3 \(Cisco 2600路由器\)](#)
- [R4 \(Cisco 2600路由器\)](#)

R1 (Cisco 2500路由器)

```
Current configuration:
!
version 12.2
service timestamps debug datetime msec
service timestamps log uptime
!
hostname R1
!
x25 routing
!--- The X.25 local switching. ! interface Serial0 no ip
address no ip directed-broadcast encapsulation x25 no ip
mroute-cache x25 address 45678 x25 win 5 !--- For
testing purposes, the X.25 flow control !--- is set to
something other than !--- the default value. In this
configuration, !--- win 5 and wout 5, and ips and ops
256 are used. x25 wout 5 x25 ips 256 x25 ops 256 x25
idle 1 ! line con 0 transport input none line aux 0 line
vty 0 4 password cisco login ! end
```

R2 (Cisco 2500路由器)

```

Current configuration
!
version 12.2
service pad to-xot
!--- Enable this command in order to make a packet
assembler/disassembler (PAD) !--- over XOT through the
router locally. It is useful for troubleshooting XOT
problems. service timestamps debug datetime msec service
timestamps log uptime ! hostname R2 ! x25 routing !---
Enables X.25 switching. !!! interface Loopback0 ip
address 10.1.2.2 255.255.255.0 ! interface Ethernet0 ip
address 10.64.9.101 255.255.255.0 no ip route-cache no
ip mroute-cache ! interface Serial0 no ip address
encapsulation x25 dce no ip mroute-cache x25 win 5 x25
wout 5 x25 ips 256 x25 ops 256 !--- Set these flow
control parameters since the interface you have
connected to !--- also has these parameters set. If not
matched, you can reset the link !--- while there are
larger packets that go over. x25 idle 1 clockrate 64000
! router rip network 10.0.0.0 ! x25 route ^12 xot
10.64.9.100 xot-keepalive-period 10 xot-keepalive-tries
3 xot-source Loopback0 x25 route ^4 interface Serial0
xot-keepalive-period 10 xot-keepalive-tries 3 !--- By
default, xot-keepalives is always enabled, uses the
default keepalive !--- period of 60 seconds, and retries
four times. Use the !--- loopback as the XOT source to
enhance the TCP connection reliability. !--- If you have
two interfaces configured for X.25 and one of the !---
interfaces goes down, one interface remains up so that
the TCP !--- connection is not interrupted. In order to
achieve this redundancy !--- connection, the XOT uses
the loopback interface since the !--- source and the TCP
connection do not fail. !--- If you want to have
redundant interfaces in your router, the !--- X.25 route
command is configured as - X.25 route ^12 xot
10.64.9.100 10.64.9.200 !--- where 10.64.9.100 and
10.64.9.200 are the remote destination IP addresses. !
line con 0 line aux 0 line vty 0 4 login ! end

```

R3 (Cisco 2600路由器)

```

Current configuration : 1427 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log uptime
!
hostname R3
!
!
x25 routing
!
!
interface Loopback0
ip address 10.1.3.1 255.255.255.0
!
interface Serial11
bandwidth 384
no ip address
encapsulation x25
no ip route-cache
no ip mroute-cache
x25 win 7
x25 wout 7
x25 ips 1024

```

```

x25 ops 1024
x25 idle 1
service-module t1 clock source internal
service-module t1 timeslots 1-6
!
interface Ethernet1/0
ip address 10.64.9.100 255.255.255.0
no ip route-cache
no ip mroute-cache
half-duplex
!
router rip
network 10.0.0.0
!
!
x25 route ^12 interface Serial1 xot-keepalive-period
 10 xot-keepalive-tries 3
x25 route ^4 xot 10.64.9.101 xot-keepalive-period
 10 xot-keepalive-tries 3 xot-source Loopback0

!
line con 0
exec-timeout 0 0
line aux 0
line vty 0 4
login
!
end

```

R4 (Cisco 2600路由器)

```

Current configuration
!
!
!
version 12.2
service timestamps debug datetime msec
service timestamps log uptime
no service password-encryption
!
hostname R4
!
!
interface Ethernet0/0
 ip address 10.64.9.88 255.255.255.0
 half-duplex
!
interface Serial1
 bandwidth 384
 no ip address
 encapsulation x25 dce
 x25 address 123456
 x25 win 7
 x25 wout 7
 x25 ips 1024
 x25 ops 1024
!--- These parameters are set for testing purposes. x25
idle 1 service-module t1 timeslots 1-6 ! line con 0 line
aux 0 line vty 0 4 password cisco login ! end

```

验证

使用本部分可确认配置能否正常运行。

[命令输出解释程序 \(仅限注册用户 \)](#) (OIT) 支持某些 **show** 命令。使用 OIT 可查看对 **show** 命令输出的分析。

- **show x25 pad** —显示关于当前开放连接的信息，包括数据包的传输、X.3参数设置和虚拟电路当前状态。
- **show x25 xot** —显示匹配一个给的标准的所有XOT虚拟电路的信息。
- **show tcp** —显示TCP连接状况。
- **填充位**—请使用此命令记录在PAD上。

当PAD呼叫从R1发出到R4时，此输出显示显示的debug输出：

```
R1#pad 123456 User Access Verification Password: lwd: Serial0: X.25 O R1 Call (15) 8 lci 1024
lwd: From (5): 45678 To (6): 123456 lwd: Facilities: (0) lwd: Call User Data (4): 0x01000000
(pad) lwd: Serial0: X.25 I R1 Call Confirm (5) 8 lci 1024 lwd: From (0): To (0): lwd:
Facilities: (0) R4>
```

此呼叫穿过R2。使用**debug x25 event**和**debug ip tcp driver**命令，此输出捕获。

```
R2#
*Mar 9 07:02:39.982: Serial0: X.25 I R1 Call (15) 8 lci 1024
*Mar 9 07:02:39.986: From (5): 45678 To (6): 123456
*Mar 9 07:02:39.990: Facilities: (0)
*Mar 9 07:02:39.990: Call User Data (4): 0x01000000 (pad)
*Mar 9 07:02:40.006: TCPDRV404EF4: Active async open 10.1.2.2:0 --> 10.64.9.100 :1998 OK, lport
11020 *Mar 9 07:02:40.034: TCPDRV404EF4: disable tcp timeouts *Mar 9 07:02:40.034: TCPDRV404EF4:
enable tcp timeouts *Mar 9 07:02:40.038: TCPDRV404EF4: keepalive interval set to 10000 ms !---
The keepalives parameters. *Mar 9 07:02:40.038: TCPDRV404EF4: keepalive attempts set to 3 *Mar 9
07:02:40.042: TCPDRV404EF4: keepalives turned on *Mar 9 07:02:40.046:
[10.64.9.100,1998/10.1.2.2,11020]: XOT O P2 Call (21) 8 lc i 1 *Mar 9 07:02:40.050: From (5):
45678 To (6): 123456 *Mar 9 07:02:40.054: Facilities: (6) *Mar 9 07:02:40.054: Packet sizes: 256
256 *Mar 9 07:02:40.058: Window sizes: 5 5 *Mar 9 07:02:40.058: Call User Data (4): 0x01000000
(pad) *Mar 9 07:02:40.182: [10.64.9.100,1998/10.1.2.2,11020]: XOT I P2 Call Confirm (11) 8 lci 1
*Mar 9 07:02:40.182: From (0): To (0): *Mar 9 07:02:40.186: Facilities: (6) *Mar 9 07:02:40.186:
Packet sizes: 256 256 *Mar 9 07:02:40.190: Window sizes: 5 5 *Mar 9 07:02:40.194: Serial0: X.25
O R1 Call Confirm (5) 8 lci 1024 *Mar 9 07:02:40.194: From (0): To (0): *Mar 9 07:02:40.198:
Facilities: (0)
```

R3通过XOT收到从R2的呼叫然后通过它对R4。使用**debug x25 event**和**debug ip tcp driver**命令，此输出捕获。

```
R3#
*Mar 9 07:00:41.338: TCPDRV27693C: Passive open 10.64.9.100:1998 <-- 10.1.2.2:1 1020
*Mar 9 07:00:41.342: TCPDRV27693C: disable tcp timeouts
*Mar 9 07:00:41.342: TCPDRV27693C: enable tcp timeouts
*Mar 9 07:00:41.370: [10.1.2.2,11020/10.64.9.100,1998]: XOT I P/Inactive Call (21) 8 lci 1
*Mar 9 07:00:41.370: From (5): 45678 To (6): 123456
*Mar 9 07:00:41.374: Facilities: (6)
*Mar 9 07:00:41.378: Packet sizes: 256 256
*Mar 9 07:00:41.378: Window sizes: 5 5
*Mar 9 07:00:41.382: Call User Data (4): 0x01000000 (pad)
*Mar 9 07:00:41.394: TCPDRV27693C: keepalive interval set to 10000 ms
*Mar 9 07:00:41.394: TCPDRV27693C: keepalive attempts set to 3
*Mar 9 07:00:41.398: TCPDRV27693C: keepalives turned on
*Mar 9 07:00:41.402: Serial1: X.25 O R1 Call (21) 8 lci 1024
*Mar 9 07:00:41.402: From (5): 45678 To (6): 123456
*Mar 9 07:00:41.406: Facilities: (6)
*Mar 9 07:00:41.410: Packet sizes: 256 256
*Mar 9 07:00:41.410: Window sizes: 5 5
*Mar 9 07:00:41.414: Call User Data (4): 0x01000000 (pad)
*Mar 9 07:00:41.454: Serial1: X.25 I R1 Call Confirm (5) 8 lci 1024 *Mar 9 07:00:41.454: From
(0): To (0): *Mar 9 07:00:41.458: Facilities: (0) *Mar 9 07:00:41.462:
[10.1.2.2,11020/10.64.9.100,1998]: XOT O P3 Call Confirm (11) 8 lci 1 *Mar 9 07:00:41.462: From
(0): To (0):
```

R4收到呼叫并且连接它到VTY端口：

```
R4#
*Mar 9 06:57:16.598: Serial1: X.25 I R1 Call (21) 8 lci 1024
*Mar 9 06:57:16.602: From (5): 45678 To (6): 123456
*Mar 9 06:57:16.606: Facilities: (6)
*Mar 9 06:57:16.606: Packet sizes: 256 256
*Mar 9 06:57:16.610: Window sizes: 5 5
*Mar 9 06:57:16.610: Call User Data (4): 0x01000000 (pad)
*Mar 9 06:57:16.622: Serial1: X.25 O R1 Call Confirm (5) 8 lci 1024 *Mar 9 06:57:16.626: From
(0): To (0): *Mar 9 06:57:16.626: Facilities: (0) R4#show x25 vc SVC 1024, State: D1, Interface:
Serial1 Started 00:02:15, last input 00:02:12, output 00:02:12 Line: 2 vty 0 Location: Host:
45678 45678 connected to 123456 PAD <--> X25 Window size input: 5, output: 5 Packet size input:
256, output: 256 PS: 4 PR: 0 ACK: 0 Remote PR: 4 RCNT: 0 RNR: no P/D state timeouts: 0 timer
(secs): 0 data bytes 47/60 packets 4/8 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0 R2#show tcp Stand-
alone TCP connection to host 10.64.9.100 Connection state is ESTAB, I/O status: 1, unread input
bytes: 0 Local host: 10.1.2.2, Local port: 11020 Foreign host: 10.64.9.100, Foreign port: 1998
Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes) TCP driver queue size 0,
flow controlled FALSE Event Timers (current time is 0x2AB893F0): Timer Starts Wakeups Next
Retrans 11 0 0x0 TimeWait 0 0 0x0 AckHold 10 0 0x0 SendWnd 0 0 0x0 KeepAlive 50 0 0x2AB8A290 !---
- Sends keepalive packets and increments. GiveUp 0 0 0x0 PmtuAger 0 0 0x0 DeadWait 0 0 0x0 iss:
1072933807 snduna: 1072933977 sndnxt: 1072933977 sndwnd: 8023 irs: 1206945087 rcvnxt: 1206945244
rcvwnd: 8036 delrcvwnd: 156 SRTT: 231 ms, RTTO: 769 ms, RTV: 538 ms, KRTT: 0 ms minRTT: 8 ms,
maxRTT: 300 ms, ACK hold: 200 ms Flags: higher precedence, retransmission timeout, keepalive
running !--- The keepalive status. Datagrams (max data segment is 536 bytes): Rcvd: 40 (out of
order: 0), with data: 10, total data bytes: 156 Sent: 41 (retransmit: 0, fastretransmit: 0),
with data: 10, total data bytes: 16 9
```

参考[X.25 route命令XOT保活选项](#)欲知更多信息。

故障排除

使用本部分可排除配置故障。

故障排除命令

[命令输出解释程序 \(仅限注册用户 \)](#) (OIT) 支持某些 **show** 命令。使用 OIT 可查看对 **show** 命令输出的分析。

注意： 使用 **debug** 命令之前，请参阅[有关 Debug 命令的重要信息](#)。

- **debug x25 events** —显示关于所有X.25流量的信息除了数据和资源记录数据包。
- **debug ip tcp driver** —显示关于TCP驱动程序事件的信息。

如果R2和R3之间的连接是残破的，TCP连接在保活周期之后切断。然后输出**show tcp**命令是空的在R2和R3路由器。

当R2和R3 XOT接口发生故障时，您能观察此debug输出：

```
R2#debug x25 events *Mar 10 05:36:24.685: [10.64.9.100,1998/10.1.2.2,11037]: XOT cx closed *Mar
10 05:36:24.689: Serial0: X.25 O R1 Clear (5) 8 lci 1024 *Mar 10 05:36:24.693: Cause 9, Diag 0
(Out of order/No additional information) *Mar 10 05:36:24.709: Serial0: X.25 I R1 Clear Confirm
(3) 8 lci 1024 R2#debug ip tcp driver *Mar 10 05:41:08.800: TCPDRV205B44: 10.1.2.2:11038 -->
10.64.9.100:1998 DoClose (Cookie 402718) tcp close R3#debug x25 events *Mar 10 05:34:27.241:
[10.1.2.2,11037/10.64.9.100,1998]: XOT cx closed *Mar 10 05:34:27.245: Serial1: X.25 O R1 Clear
(5) 8 lci 1024 *Mar 10 05:34:27.245: Cause 0, Diag 0 (DTE originated/No additional information)
*Mar 10 05:34:27.261: Serial1: X.25 I R1 Clear Confirm (3) 8 lci 1024 R3#debug ip tcp driver
*Mar 10 05:39:11.321: TCPDRV354BB8: 10.64.9.100:1998 --> 10.1.2.2:11038 DoClose (Cookie 354B5C)
tcp close
```

相关信息

- [X.25和LAPB命令](#)
- [X.25协议技术支持](#)
- [技术支持和文档 - Cisco Systems](#)