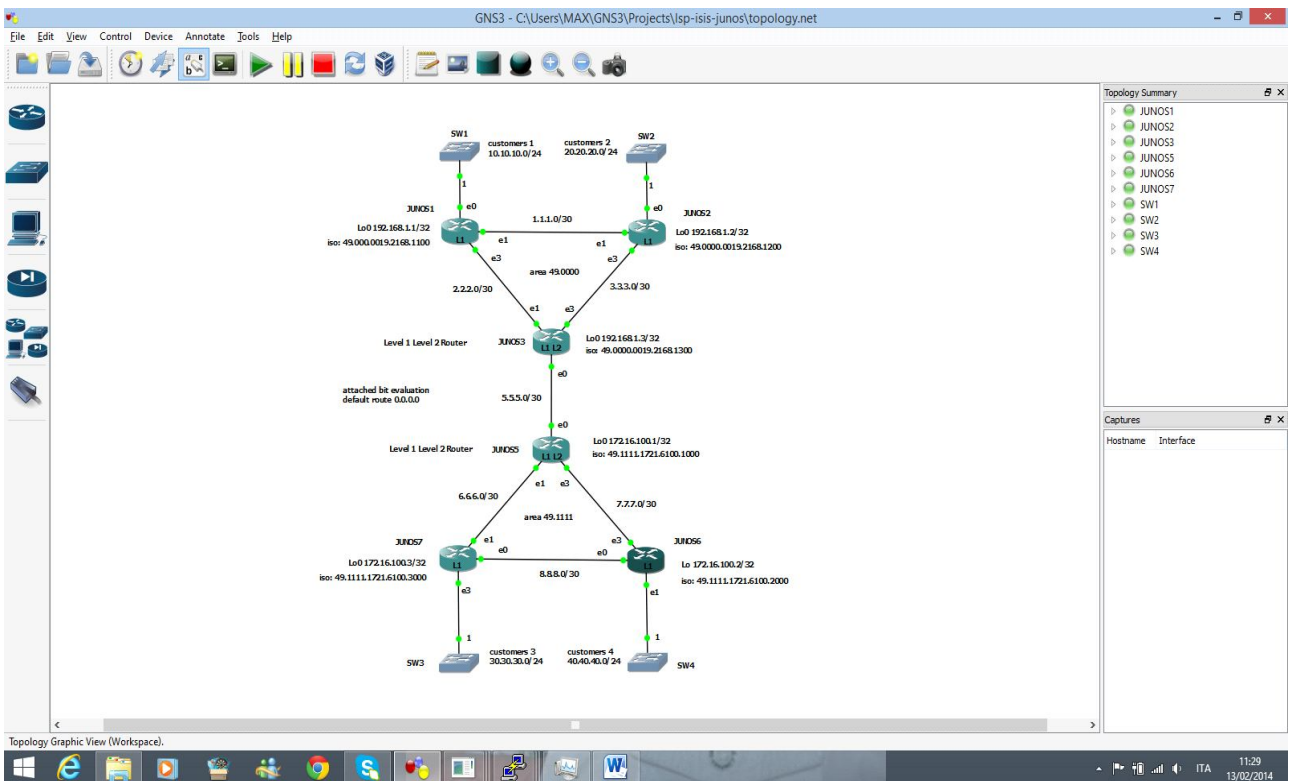


In questo documento mettiamo in evidenza:

- Tabella di routing ISIS
- Level 1 Level 2 router
- ISIS database
- Attached bit evaluation (ISIS overview)
- ISIS interface
- Connettività (ping e tracert)
- Configuration Guide routers

L'architettura di riferimento è la seguente:



Premesso:

- JUNOS3 e JUNOS5 hanno il ruolo di L1 L2 router
- JUNOS1, JUNOS2, JUNOS6, JUNOS7 hanno ruolo L1 router
- Due aree ISIS 49.0000 e 49.0001
- Attached Bit Enabled (default route 0.0.0.0)

root@JUNOS1> show route

inet.0: 12 destinations, 12 routes (12 active, 0 holddown, 0 hidden)

+ = Active Route, - = Last Active, * = Both

```

0.0.0.0/0      *[IS-IS/15] 00:06:52, metric 10
                > to 2.2.2.2 via em3.0
1.1.1.0/30    *[Direct/0] 00:12:48
                > via em1.0
1.1.1.1/32    *[Local/0] 00:12:48
                Local via em1.0
2.2.2.0/30    *[Direct/0] 00:12:48
                > via em3.0
2.2.2.1/32    *[Local/0] 00:12:48
                Local via em3.0
3.3.3.0/30    *[IS-IS/15] 00:11:41, metric 20
                > to 1.1.1.2 via em1.0
                to 2.2.2.2 via em3.0
5.5.5.0/30    *[IS-IS/15] 00:11:41, metric 20
                > to 2.2.2.2 via em3.0
10.10.10.0/24 *[Direct/0] 00:12:48
                > via em0.0
10.10.10.1/32 *[Local/0] 00:12:48
                Local via em0.0
20.20.20.0/24 *[IS-IS/15] 00:12:02, metric 20
                > to 1.1.1.2 via em1.0
192.168.1.1/32 *[Direct/0] 00:12:48
                > via lo0.0
192.168.1.2/32 *[IS-IS/15] 00:12:02, metric 10
                > to 1.1.1.2 via em1.0

```

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

+ = Active Route, - = Last Active, * = Both

```

49.0000.0019.2168.1100/72
    *[Direct/0] 00:12:48
    > via lo0.0

```

root@JUNOS1> show isis route

IS-IS routing table **Current version: L1: 8 L2: 0**

IPv4/IPv6 Routes

| Prefix | L Version | Metric | Type | Interface | NH | Via |
|------------------|-----------|--------|------|-----------|-------|--------------------|
| 0.0.0.0/0 | 1 | 8 | 10 | int | em3.0 | IPV4 JUNOS3 |
| 3.3.3.0/30 | 1 | 8 | 20 | int | em1.0 | IPV4 JUNOS2 |
| | | | | | em3.0 | IPV4 JUNOS3 |
| 5.5.5.0/30 | 1 | 8 | 20 | int | em3.0 | IPV4 JUNOS3 |
| 20.20.20.0/24 | 1 | 8 | 20 | int | em1.0 | IPV4 JUNOS2 |
| 192.168.1.2/32 | 1 | 8 | 10 | int | em1.0 | IPV4 JUNOS2 |

root@JUNOS1> show isis database

IS-IS level 1 link-state database:

| LSP ID | Sequence | Checksum | Lifetime | Attributes |
|---------------------|------------|---------------|------------|-----------------------|
| JUNOS1.00-00 | 0x4 | 0x71c6 | 1023 | L1 |
| JUNOS2.00-00 | 0x4 | 0x70ec | 974 | L1 |
| JUNOS3.00-00 | 0x4 | 0x2901 | 619 | L1 L2 Attached |

3 LSPs

IS-IS level 2 link-state database:

0 LSPs

root@JUNOS1> show isis overview

Instance: master

Router ID: 192.168.1.1

Adjacency holddown: enabled

Maximum Areas: 3

LSP life time: 1200

Attached bit evaluation: enabled

SPF delay: 200 msec, SPF holddown: 5000 msec, SPF rapid runs: 3

IPv4 is enabled, IPv6 is enabled

Traffic engineering: enabled

Restart: Enabled

Restart duration: 210 sec

Helper mode: Enabled

Level 1

Internal route preference: 15

External route preference: 160

Wide metrics are enabled, Narrow metrics are enabled

Level 2

Internal route preference: 18

External route preference: 165

Wide metrics are enabled, Narrow metrics are enabled

root@JUNOS1> show isis interface

IS-IS interface database:

| Interface | L CirID | Level 1 DR | Level 2 DR | L1/L2 Metric |
|-----------|---------|--------------------|------------|--------------|
| em0.0 | 0 | 0x1 Passive | Passive | 10/10 |
| em1.0 | 1 | 0x1 Point to Point | Disabled | 10/10 |
| em3.0 | 1 | 0x1 Point to Point | Disabled | 10/10 |
| lo0.0 | 0 | 0x1 Passive | Passive | 0/0 |

root@JUNOS1> ping 30.30.30.1

PING 30.30.30.1 (30.30.30.1): 56 data bytes
64 bytes from 30.30.30.1: icmp_seq=0 ttl=62 time=2.003 ms
64 bytes from 30.30.30.1: icmp_seq=1 ttl=62 time=2.050 ms
^C
--- 30.30.30.1 ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max/stddev = 2.003/2.026/2.050/0.023 ms

root@JUNOS1> ping 40.40.40.1

PING 40.40.40.1 (40.40.40.1): 56 data bytes
64 bytes from 40.40.40.1: icmp_seq=0 ttl=62 time=2.363 ms
64 bytes from 40.40.40.1: icmp_seq=1 ttl=62 time=2.528 ms
64 bytes from 40.40.40.1: icmp_seq=2 ttl=62 time=1.309 ms
^C
--- 40.40.40.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 1.309/2.067/2.528/0.540 ms

root@JUNOS1> traceroute 30.30.30.1

traceroute to 30.30.30.1 (30.30.30.1), 30 hops max, 40 byte packets
1 2.2.2.2 (2.2.2.2) 1.171 ms 0.457 ms 0.360 ms
2 5.5.5.2 (5.5.5.2) 1.112 ms 0.918 ms 0.899 ms
3 30.30.30.1 (30.30.30.1) 2.413 ms 2.305 ms 1.417 ms

root@JUNOS1> traceroute 40.40.40.1

traceroute to 40.40.40.1 (40.40.40.1), 30 hops max, 40 byte packets
1 2.2.2.2 (2.2.2.2) 0.560 ms 0.567 ms 0.560 ms
2 5.5.5.2 (5.5.5.2) 1.590 ms 1.237 ms 1.363 ms
3 40.40.40.1 (40.40.40.1) 2.034 ms 2.692 ms 1.858 ms

root@JUNOS3> show route

inet.0: 20 destinations, 20 routes (20 active, 0 holddown, 0 hidden)

+ = Active Route, - = Last Active, * = Both

```

1.1.1.0/30    *[IS-IS/15] 00:18:32, metric 20
              to 2.2.2.1 via em1.0
              > to 3.3.3.1 via em3.0
2.2.2.0/30    *[Direct/0] 00:19:30
              > via em1.0
2.2.2.2/32    *[Local/0] 00:19:30
              Local via em1.0
3.3.3.0/30    *[Direct/0] 00:19:30
              > via em3.0
3.3.3.2/32    *[Local/0] 00:19:30
              Local via em3.0
5.5.5.0/30    *[Direct/0] 00:19:30
              > via em0.0
5.5.5.1/32    *[Local/0] 00:19:30
              Local via em0.0
6.6.6.0/30    *[IS-IS/18] 00:13:43, metric 20
              > to 5.5.5.2 via em0.0
7.7.7.0/30    *[IS-IS/18] 00:13:43, metric 20
              > to 5.5.5.2 via em0.0
8.8.8.0/30    *[IS-IS/18] 00:13:36, metric 30
              > to 5.5.5.2 via em0.0
10.10.10.0/24  *[IS-IS/15] 00:18:32, metric 20
              > to 2.2.2.1 via em1.0
20.20.20.0/24  *[IS-IS/15] 00:19:17, metric 20
              > to 3.3.3.1 via em3.0
30.30.30.0/24  *[IS-IS/18] 00:13:13, metric 30
              > to 5.5.5.2 via em0.0
40.40.40.1/32  *[IS-IS/18] 00:13:36, metric 30
              > to 5.5.5.2 via em0.0
172.16.100.1/32 *[IS-IS/18] 00:13:43, metric 10
              > to 5.5.5.2 via em0.0
172.16.100.2/32 *[IS-IS/18] 00:13:36, metric 20
              > to 5.5.5.2 via em0.0
172.16.100.3/32 *[IS-IS/18] 00:13:13, metric 20
              > to 5.5.5.2 via em0.0
192.168.1.1/32  *[IS-IS/15] 00:00:36, metric 10
              > to 2.2.2.1 via em1.0
192.168.1.2/32  *[IS-IS/15] 00:19:17, metric 10
              > to 3.3.3.1 via em3.0
192.168.1.3/32  *[Direct/0] 00:19:30
              > via lo0.0
    
```

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

+ = Active Route, - = Last Active, * = Both

49.0000.0019.2168.1300/72
*[Direct/0] 00:19:30
> via lo0.0

root@JUNOS3> show isis route

IS-IS routing table **Current version: L1: 9 L2: 11**
IPv4/IPv6 Routes

| Prefix | L Version | Metric | Type | Interface | NH | Via |
|-----------------|-----------|--------|------|-----------|-------|-------------|
| 1.1.1.0/30 | 1 | 9 | 20 | int | em1.0 | IPV4 JUNOS1 |
| | | | | | em3.0 | IPV4 JUNOS2 |
| 6.6.6.0/30 | 2 | 11 | 20 | int | em0.0 | IPV4 JUNOS5 |
| 7.7.7.0/30 | 2 | 11 | 20 | int | em0.0 | IPV4 JUNOS5 |
| 8.8.8.0/30 | 2 | 11 | 30 | int | em0.0 | IPV4 JUNOS5 |
| 10.10.10.0/24 | 1 | 9 | 20 | int | em1.0 | IPV4 JUNOS1 |
| 20.20.20.0/24 | 1 | 9 | 20 | int | em3.0 | IPV4 JUNOS2 |
| 30.30.30.0/24 | 2 | 11 | 30 | int | em0.0 | IPV4 JUNOS5 |
| 40.40.40.1/32 | 2 | 11 | 30 | int | em0.0 | IPV4 JUNOS5 |
| 172.16.100.1/32 | 2 | 11 | 10 | int | em0.0 | IPV4 JUNOS5 |
| 172.16.100.2/32 | 2 | 11 | 20 | int | em0.0 | IPV4 JUNOS5 |
| 172.16.100.3/32 | 2 | 11 | 20 | int | em0.0 | IPV4 JUNOS5 |
| 192.168.1.1/32 | 1 | 9 | 10 | int | em1.0 | IPV4 JUNOS1 |
| 192.168.1.2/32 | 1 | 9 | 10 | int | em3.0 | IPV4 JUNOS2 |

root@JUNOS3> show isis database

IS-IS level 1 link-state database:

| LSP ID | Sequence | Checksum | Lifetime | Attributes |
|---------------------|------------|---------------|-------------|-----------------------|
| JUNOS1.00-00 | 0x7 | 0xf0b6 | 1018 | L1 |
| JUNOS2.00-00 | 0x4 | 0x70ec | 585 | L1 |
| JUNOS3.00-00 | 0x5 | 0x2702 | 1078 | L1 L2 Attached |

3 LSPs

IS-IS level 2 link-state database:

| LSP ID | Sequence | Checksum | Lifetime | Attributes |
|--------------|----------|----------|----------|------------|
| JUNOS3.00-00 | 0x6 | 0x64b6 | 1019 | L1 L2 |
| JUNOS5.00-00 | 0x4 | 0x7470 | 260 | L1 L2 |

2 LSPs

root@JUNOS3> show isis overview

Instance: master
Router ID: 192.168.1.3
Adjacency holddown: enabled
Maximum Areas: 3
LSP life time: 1200
Attached bit evaluation: enabled
SPF delay: 200 msec, SPF holddown: 5000 msec, SPF rapid runs: 3
IPv4 is enabled, IPv6 is enabled
Traffic engineering: enabled
Restart: Enabled
Restart duration: 210 sec
Helper mode: Enabled
Level 1
Internal route preference: 15
External route preference: 160
Wide metrics are enabled, Narrow metrics are enabled
Level 2
Internal route preference: 18
External route preference: 165
Wide metrics are enabled, Narrow metrics are enabled

root@JUNOS3> show isis interface

IS-IS interface database:

| Interface | L CirID | Level 1 DR | Level 2 DR | L1/L2 Metric |
|-----------|---------|----------------|----------------|--------------|
| em0.0 | 3 0x1 | Point to Point | Point to Point | 10/10 |
| em1.0 | 3 0x1 | Point to Point | Point to Point | 10/10 |
| em3.0 | 3 0x1 | Point to Point | Point to Point | 10/10 |
| lo0.0 | 0 0x1 | Passive | Passive | 0/0 |

root@JUNOS6> show route

inet.0: 10 destinations, 11 routes (10 active, 0 holddown, 0 hidden)

+ = Active Route, - = Last Active, * = Both

```

0.0.0.0/0      *[IS-IS/15] 00:17:55, metric 10
                > to 7.7.7.1 via em3.0
6.6.6.0/30    *[IS-IS/15] 00:17:11, metric 20
                > to 8.8.8.1 via em0.0
                to 7.7.7.1 via em3.0
7.7.7.0/30    *[Direct/0] 00:18:09
                > via em3.0
7.7.7.2/32    *[Local/0] 00:18:09
                Local via em3.0
8.8.8.0/30    *[Direct/0] 00:18:09
                > via em0.0
8.8.8.2/32    *[Local/0] 00:18:09
                Local via em0.0
30.30.30.0/24 *[IS-IS/15] 00:17:11, metric 20
                > to 8.8.8.1 via em0.0
40.40.40.1/32 *[Direct/0] 00:18:09
                > via em1.0
                [Local/0] 00:18:09
                Local via em1.0
172.16.100.2/32 *[Direct/0] 00:18:09
                > via lo0.0
172.16.100.3/32 *[IS-IS/15] 00:17:11, metric 10
                > to 8.8.8.1 via em0.0

```

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)

+ = Active Route, - = Last Active, * = Both

```

49.1111.1721.6100.2000/72
    *[Direct/0] 00:18:09
    > via lo0.0

```

root@JUNOS6> show isis route

IS-IS routing table Current version: L1: 6 L2: 6

IPv4/IPv6 Routes

| Prefix | L | Version | Metric | Type | Interface | NH | Via |
|------------------|---|---------|--------|------|-----------|------|---------------|
| 0.0.0.0/0 | 1 | 6 | 10 | int | em3.0 | IPV4 | JUNOS5 |
| 6.6.6.0/30 | 1 | 6 | 20 | int | em3.0 | IPV4 | JUNOS5 |
| | | | | | em0.0 | IPV4 | JUNOS7 |
| 30.30.30.0/24 | 1 | 6 | 20 | int | em0.0 | IPV4 | JUNOS7 |
| 172.16.100.3/32 | 1 | 6 | 10 | int | em0.0 | IPV4 | JUNOS7 |

CONFIGURATION GUIDE

Router di Area 409.0000

root@JUNOS1> show configuration

Last commit: 2014-02-13 09:51:32 UTC by root

version 10.1R1.8;

system {

host-name JUNOS1;

root-authentication {

encrypted-password "\$1\$5Ns2jTZU\$MNb26tfWTe8yG9T9Y3Rwo1"; ## SECRET-DATA

}

syslog {

user * {

any emergency;

}

file messages {

any notice;

authorization info;

}

file interactive-commands {

interactive-commands any;

}

}

}

interfaces {

em0 {

unit 0 {

description LAN1;

family inet {

address 10.10.10.1/24;

}

family iso;

}

}

em1 {

unit 0 {

description "to J2";

family inet {

address 1.1.1.1/30;

}

family iso;

}

}

em3 {

unit 0 {

description "to J3";

family inet {

address 2.2.2.1/30;

}

}

}

```
    family iso;
  }
}
lo0 {
  unit 0 {
    description RID;
    family inet {
      address 192.168.1.1/32;
    }
    family iso {
      address 49.0000.0019.2168.1100.00;
    }
  }
}
}
}
protocols {
  isis {
    level 2 disable;
    interface em0.0 {
      passive;
    }
    interface em1.0 {
      point-to-point;
    }
    interface em3.0 {
      point-to-point;
    }
    interface lo0.0;
  }
}
}
```

Router L1 L2 level

root@JUNOS3> show configuration

```
## Last commit: 2014-02-13 09:55:56 UTC by root
version 10.1R1.8;
system {
  host-name JUNOS3;
  root-authentication {
    encrypted-password "$1$7Yno.KpK$yg/IIfRILnk74.gHo2e9u/"; ## SECRET-DATA
  }
  syslog {
    user * {
      any emergency;
    }
    file messages {
      any notice;
      authorization info;
    }
    file interactive-commands {
      interactive-commands any;
    }
  }
}
interfaces {
  em0 {
    unit 0 {
      description "to J5 L2";
      family inet {
        address 5.5.5.1/30;
      }
      family iso;
    }
  }
  em1 {
    unit 0 {
      description "to J1";
      family inet {
        address 2.2.2.2/30;
      }
      family iso;
    }
  }
  em3 {
    unit 0 {
      description "to J2";
      family inet {
        address 3.3.3.2/30;
      }
      family iso;
    }
  }
}
```

```
    }  
  }  
  lo0 {  
    unit 0 {  
      description RID;  
      family inet {  
        address 192.168.1.3/32;  
      }  
      family iso {  
        address 49.0000.0019.2168.1300.00;  
      }  
    }  
  }  
}  
protocols {  
  isis {  
    interface em0.0 {  
      point-to-point;  
    }  
    interface em1.0 {  
      point-to-point;  
    }  
    interface em3.0 {  
      point-to-point;  
    }  
    interface lo0.0;  
  }  
}
```

root@JUNOS5> show configuration

```
## Last commit: 2014-02-02 10:49:39 UTC by root
version 10.1R1.8;
system {
  host-name JUNOS5;
  root-authentication {
    encrypted-password "$1$OXxYcw7D$6gDxAF/.oMHvreDPMJdgy1"; ## SECRET-DATA
  }
  syslog {
    user * {
      any emergency;
    }
    file messages {
      any notice;
      authorization info;
    }
    file interactive-commands {
      interactive-commands any;
    }
  }
}
interfaces {
  em0 {
    unit 0 {
      description "to J3 L2";
      family inet {
        address 5.5.5.2/30;
      }
      family iso;
    }
  }
  em1 {
    unit 0 {
      description "to J6";
      family inet {
        address 6.6.6.1/30;
      }
      family iso;
    }
  }
  em3 {
    unit 0 {
      description "to J7";
      family inet {
        address 7.7.7.1/30;
      }
      family iso;
    }
  }
}
```

```
lo0 {
  unit 0 {
    description RID;
    family inet {
      address 172.16.100.1/32;
    }
    family iso {
      address 49.1111.1721.6100.1000.00;
    }
  }
}
}
protocols {
  isis {
    interface em0.0 {
      point-to-point;
      level 1 disable;
    }
    interface em1.0 {
      point-to-point;
      level 2 disable;
    }
    interface em3.0 {
      point-to-point;
      level 2 disable;
    }
    interface lo0.0 {
      level 1 disable;
    }
  }
}
}
```

Router di Area 49.0001

root@JUNOS6> show configuration

Last commit: 2014-02-02 10:35:30 UTC by root

version 10.1R1.8;

system {

 host-name JUNOS6;

 root-authentication {

 encrypted-password "\$1\$WRCyen9S\$pocKmxnxFfRaNNU30x/3Y0"; ## SECRET-DATA

 }

 syslog {

 user * {

 any emergency;

 }

 file messages {

 any notice;

 authorization info;

 }

 file interactive-commands {

 interactive-commands any;

 }

 }

}

interfaces {

 em0 {

 unit 0 {

 description "to J7";

 family inet {

 address 8.8.8.2/30;

 }

 family iso;

 }

 }

 em1 {

 unit 0 {

 description LAN4;

 family inet {

 address 40.40.40.1/32;

 }

 family iso;

 }

 }

 em3 {

 unit 0 {

 description "to J5";

 family inet {

 address 7.7.7.2/30;

 }

 family iso;

 }

 }

```
}
lo0 {
  unit 0 {
    description RID;
    family inet {
      address 172.16.100.2/32;
    }
    family iso {
      address 49.1111.1721.6100.2000.00;
    }
  }
}
}
}
protocols {
  isis {
    interface em0.0 {
      point-to-point;
      level 2 disable;
    }
    interface em1.0 {
      passive;
    }
    interface em3.0 {
      point-to-point;
      level 2 disable;
    }
    interface lo0.0 {
      level 2 disable;
    }
  }
}
}
```