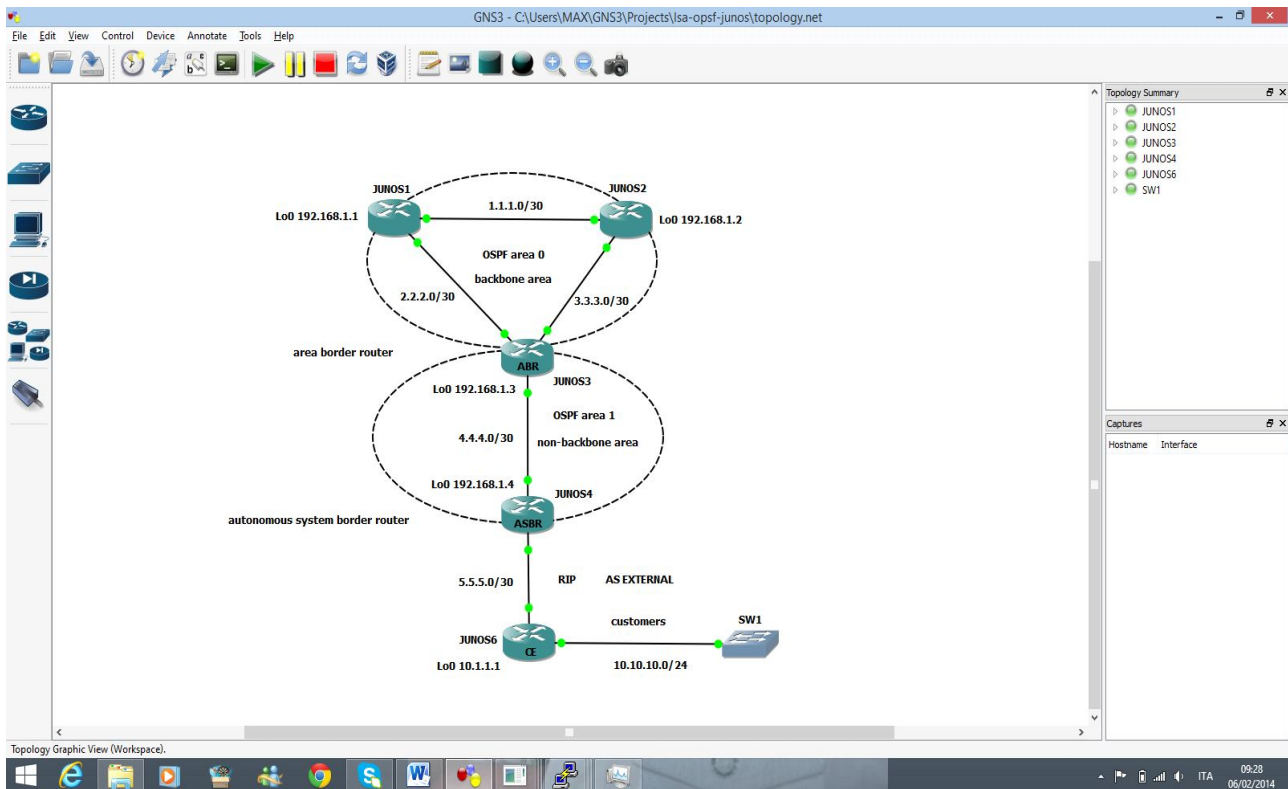


OSPF LSA TYPE 1-2-3-4-5

L'architettura di riferimento è la seguente:



LSA Type 1 è indicato come **ROUTER** (backbone router) ed è generato da tutti i router OSPF all'interno di una stessa area (intra-area) e descrive lo stato ed il costo dei link di connessione tra essi.

LSA Type 2 è indicato come **NETWORK** ed è generato da DR (Designated Router) in una rete LAN (broadcast domain) e lista ogni router connesso ad un broadcast link, includendo se stesso come DR.

LSA Type 3 è indicato come **SUMMARY** ed è generato da un ABR (Area Border Router), trasportando informazioni di routing summarize tra ospf aree.

LSA Type 4 è indicato come **ASBR SUMMARY** ed è generato da ABR (Area Border Router); ogni ABR che trasporta external routes deve provvedere ad informare la raggiungibilità di esse associate con l'ASBR

LSA Type 5 è indicato come **EXTERNAL** ed è generato da ASBR (Autonomous System Border Router) per trasportare informazioni di routing (prefix IP) che sono esterni al dominio ospf.

In questo documento vediamo:

- LSDB database LSA type

 root@JUNOS1> show ospf database (router di backbone area 0)

OSPF database, Area 0.0.0.0

Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Router	*192.168.1.1	192.168.1.1	0x80000006	517	0x22	0xa81b	84
Router	192.168.1.2	192.168.1.2	0x80000004	482	0x22	0xcbf0	84
Router	192.168.1.3	192.168.1.3	0x80000005	488	0x22	0xb2fe	84
Summary	4.4.4.0	192.168.1.3	0x80000002	524	0x22	0xc9fa	28 <i>(generato da ABR)</i>
Summary	192.168.1.4	192.168.1.3	0x80000001	95	0x22	0x89d6	28 <i>(generato da ABR)</i>
ASBRSum	192.168.1.4	192.168.1.3	0x80000001	95	0x22	0x7be3	28 <i>(generato da ABR)</i>

OSPF AS SCOPE link state database

Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Extern	10.1.1.1	192.168.1.4	0x80000001	100	0x22	0x46ee	36 <i>(generato da ASBR)</i>
Extern	10.10.10.0	192.168.1.4	0x80000001	100	0x22	0x80a3	36 <i>(generato da ASBR)</i>

p.s. stesso output su JUNOS 2 router di backbone area 0

 root@JUNOS3> show ospf database (router ABR)

OSPF database, Area 0.0.0.0

Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Router	192.168.1.1	192.168.1.1	0x80000006	661	0x22	0xa81b	84
Router	192.168.1.2	192.168.1.2	0x80000004	627	0x22	0xcbf0	84
Router	*192.168.1.3	192.168.1.3	0x80000005	631	0x22	0xb2fe	84
Summary	*4.4.4.0	192.168.1.3	0x80000002	666	0x22	0xc9fa	28 <i>(generato da ABR)</i>
Summary	*192.168.1.4	192.168.1.3	0x80000001	264	0x22	0x89d6	28 <i>(generato da ABR)</i>
ASBRSum	*192.168.1.4	192.168.1.3	0x80000001	264	0x22	0x7be3	28 <i>(generato da ABR)</i>

OSPF database, Area 0.0.0.1

Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Router	*192.168.1.3	192.168.1.3	0x80000003	269	0x22	0x744b	48
Router	192.168.1.4	192.168.1.4	0x80000004	241	0x22	0xf648	60
Summary	*1.1.1.0	192.168.1.3	0x80000001	654	0x22	0x428b	28 <i>(generato da ABR)</i>
Summary	*2.2.2.0	192.168.1.3	0x80000002	666	0x22	0x12b8	28 <i>(generato da ABR)</i>
Summary	*3.3.3.0	192.168.1.3	0x80000002	666	0x22	0xedd9	28 <i>(generato da ABR)</i>
Summary	*192.168.1.1	192.168.1.3	0x80000001	654	0x22	0xa7bb	28 <i>(generato da ABR)</i>
Summary	*192.168.1.2	192.168.1.3	0x80000001	654	0x22	0x9dc4	28 <i>(generato da ABR)</i>
Summary	*192.168.1.3	192.168.1.3	0x80000002	666	0x22	0x87d9	28 <i>(generato da ABR)</i>

OSPF AS SCOPE link state database

Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Extern	10.1.1.1	192.168.1.4	0x80000001	270	0x22	0x46ee	36 <i>(generato da ASBR)</i>
Extern	10.10.10.0	192.168.1.4	0x80000001	270	0x22	0x80a3	36 <i>(generato da ASBR)</i>

 root@JUNOS4> show ospf database (router ASBR)

OSPF database, Area 0.0.0.1

Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Router	192.168.1.3	192.168.1.3	0x80000003	580	0x22	0x744b	48
Router	*192.168.1.4	192.168.1.4	0x80000004	542	0x22	0xf648	60
Summary	1.1.1.0	192.168.1.3	0x80000001	965	0x22	0x428b	28 <i>(generato da ABR)</i>
Summary	2.2.2.0	192.168.1.3	0x80000003	48	0x22	0x10b9	28 <i>(generato da ABR)</i>
Summary	3.3.3.0	192.168.1.3	0x80000002	977	0x22	0xedd9	28 <i>(generato da ABR)</i>
Summary	192.168.1.1	192.168.1.3	0x80000001	965	0x22	0xa7bb	28 <i>(generato da ABR)</i>
Summary	192.168.1.2	192.168.1.3	0x80000001	965	0x22	0x9dc4	28 <i>(generato da ABR)</i>
Summary	192.168.1.3	192.168.1.3	0x80000002	977	0x22	0x87d9	28 <i>(generato da ABR)</i>

OSPF AS SCOPE link state database

Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Extern	*10.1.1.1	192.168.1.4	0x80000001	579	0x22	0x46ee	36 <i>(generato da ASBR)</i>
Extern	*10.10.10.0	192.168.1.4	0x80000001	579	0x22	0x80a3	36 <i>(generato da ASBR)</i>

- **OSPF ROUTE Type**

root@JUNOS1> show ospf route

Topology default Route Table:

Prefix	Path Type	Route Type	NH Type	Metric	NextHop Interface	Nexthop Address/LSP
192.168.1.2	Intra	Router	IP	1	em1.0	1.1.1.2
192.168.1.3	Intra	Area BR	IP	1	em5.0	2.2.2.2
192.168.1.4	Inter	AS BR	IP	2	em5.0	2.2.2.2
1.1.1.0/30	Intra	Network	IP	1	em1.0	
2.2.2.0/30	Intra	Network	IP	1	em5.0	
3.3.3.0/30	Intra	Network	IP	2	em1.0	1.1.1.2
					em5.0	2.2.2.2
4.4.4.0/30	Inter	Network	IP	2	em5.0	2.2.2.2
10.1.1.1/32	Ext2	Network	IP	2	em5.0	2.2.2.2
10.10.10.0/24	Ext2	Network	IP	2	em5.0	2.2.2.2
192.168.1.1/32	Intra	Network	IP	0	lo0.0	
192.168.1.2/32	Intra	Network	IP	1	em1.0	1.1.1.2
192.168.1.3/32	Intra	Network	IP	1	em5.0	2.2.2.2
192.168.1.4/32	Inter	Network	IP	2	em5.0	2.2.2.2

root@JUNOS3> show ospf route (ABR)

Topology default Route Table:

Prefix	Path Type	Route Type	NH Type	Metric	NextHop Interface	Nexthop Address/LSP
192.168.1.1	Intra	Router	IP	1	em5.0	2.2.2.1
192.168.1.2	Intra	Router	IP	1	em3.0	3.3.3.1
192.168.1.4	Intra	AS BR	IP	1	em1.0	4.4.4.1
1.1.1.0/30	Intra	Network	IP	2	em5.0	2.2.2.1
					em3.0	3.3.3.1
2.2.2.0/30	Intra	Network	IP	1	em5.0	
3.3.3.0/30	Intra	Network	IP	1	em3.0	
4.4.4.0/30	Intra	Network	IP	1	em1.0	
10.1.1.1/32	Ext2	Network	IP	2	em1.0	4.4.4.1
10.10.10.0/24	Ext2	Network	IP	2	em1.0	4.4.4.1
192.168.1.1/32	Intra	Network	IP	1	em5.0	2.2.2.1
192.168.1.2/32	Intra	Network	IP	1	em3.0	3.3.3.1
192.168.1.3/32	Intra	Network	IP	0	lo0.0	
192.168.1.4/32	Intra	Network	IP	1	em1.0	4.4.4.1

root@JUNOS4> show route (ASBR)

inet.0: 15 destinations, 15 routes (15 active, 0 holddown, 0 hidden)

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

```

1.1.1.0/30    *[OSPF/10] 00:24:26, metric 3
              > to 4.4.4.2 via em1.0
2.2.2.0/30    *[OSPF/10] 00:24:26, metric 2
              > to 4.4.4.2 via em1.0
3.3.3.0/30    *[OSPF/10] 00:24:26, metric 2
              > to 4.4.4.2 via em1.0
4.4.4.0/30    *[Direct/0] 00:24:47
              > via em1.0
4.4.4.1/32    *[Local/0] 00:24:47
              Local via em1.0
5.5.5.0/30    *[Direct/0] 00:24:47
              > via em3.0
5.5.5.1/32    *[Local/0] 00:24:47
              Local via em3.0
10.1.1.1/32  *[RIP/100] 00:24:33, metric 2, tag 0
              > to 5.5.5.2 via em3.0
10.10.10.0/24 *[RIP/100] 00:24:33, metric 2, tag 0
              > to 5.5.5.2 via em3.0
192.168.1.1/32 *[OSPF/10] 00:24:26, metric 2
              > to 4.4.4.2 via em1.0
192.168.1.2/32 *[OSPF/10] 00:24:26, metric 2
              > to 4.4.4.2 via em1.0
192.168.1.3/32 *[OSPF/10] 00:24:26, metric 1
              > to 4.4.4.2 via em1.0
192.168.1.4/32 *[Direct/0] 00:24:47
              > via lo0.0
224.0.0.5/32  *[OSPF/10] 00:25:13, metric 1
              MultiRecv
224.0.0.9/32  *[RIP/100] 00:25:08, metric 1
              MultiRecv
    
```

segue ./.

CONFIGURAZIONE ROUTER:

Router di backbone area 0:

```

root@JUNOS1> show configuration
## Last commit: 2014-02-02 18:03:45 UTC by root
version 10.1R1.8;
system {
  host-name JUNOS1;
  root-authentication {
    encrypted-password "$1$bIMmtVsl$u5xT1yJ7E0vk8teaWL62j0"; ## SECRET-DATA
  }
}
interfaces {
  em1 {
    unit 0 {
      description "P2P to R2";
      family inet {
        address 1.1.1.1/30;
      }
    }
  }
  em5 {
    unit 0 {
      description "P2P to R3";
      family inet {
        address 2.2.2.1/30;
      }
    }
  }
  lo0 {
    unit 0 {
      description RID;
      family inet {
        address 192.168.1.1/32;
      }
    }
  }
}
protocols {
  ospf {
    area 0.0.0.0 {
      interface em1.0 {
        interface-type p2p;
      }
      interface lo0.0;
      interface em5.0 {
        interface-type p2p;
      }
    }
  }
}
}

```

Router ABR:

```

root@JUNOS3> show configuration
## Last commit: 2014-02-02 18:04:06 UTC by root
version 10.1R1.8;
system {
  host-name JUNOS3;
  root-authentication {
    encrypted-password "$1$9ecjfb1M$VlvkKNPOUbd/rQS4gptXu1"; ## SECRET-DATA
  }
}
interfaces {
  em1 {
    unit 0 {
      description "P2P to R4";
      family inet {
        address 4.4.4.2/30;
      }
    }
  }
  em3 {
    unit 0 {
      description "P2P to R2";
      family inet {
        address 3.3.3.2/30;
      }
    }
  }
  em5 {
    unit 0 {
      description "P2P to R1";
      family inet {
        address 2.2.2.2/30;
      }
    }
  }
  lo0 {
    unit 0 {
      description RID;
      family inet {
        address 192.168.1.3/32;
      }
    }
  }
}
protocols {
  ospf {
    area 0.0.0.0 {
      interface em3.0 {
        interface-type p2p;
      }
      interface em5.0 {
        interface-type p2p;
      }
      interface lo0.0;
    }
    area 0.0.0.1 {
      interface em1.0 {
        interface-type p2p;
      }
    }
  }
}

```


Router ASBR:

```

root@JUNOS4> show configuration
## Last commit: 2014-02-02 18:52:50 UTC by root
version 10.1R1.8;
system {
  host-name JUNOS4;
  root-authentication {
    encrypted-password "$1$sMIW7dkF$5UBT53.rFo6Qb.U7jixp/"; ## SECRET-DATA
  }
}
interfaces {
  em1 {
    unit 0 {
      description "P2P to R3-ABR";
      family inet {
        address 4.4.4.1/30;
      }
    }
  }
  em3 {
    unit 0 {
      description "to CE";
      family inet {
        address 5.5.5.1/30;
      }
    }
  }
  lo0 {
    unit 0 {
      description RID;
      family inet {
        address 192.168.1.4/32;
      }
    }
  }
}
protocols {
  ospf {
    export EXP-RIP-OSPF;
    area 0.0.0.1 {
      interface em1.0 {
        interface-type p2p;
      }
      interface lo0.0;
    }
  }
  rip {
    group CE {
      neighbor em3.0;
    }
  }
}
policy-options {
  policy-statement EXP-RIP-OSPF {
    from protocol rip;
    then accept;
  }
}

```

Router CE customers:

```
root@JUNOS6-CE> show ospf route
OSPF instance is not running
```

```
root@JUNOS6-CE> show configuration
## Last commit: 2014-02-06 08:24:34 UTC by root
version 10.1R1.8;
system {
  host-name JUNOS6-CE;
  root-authentication {
    encrypted-password "$1$/AB9zipY$tjZ.J5Fkt.uh8z0obNCfi/"; ## SECRET-DATA
  }
}
interfaces {
  em1 {
    unit 0 {
      description LAN;
      family inet {
        address 10.10.10.1/24;
      }
    }
  }
  em3 {
    unit 0 {
      description "to ASBR";
      family inet {
        address 5.5.5.2/30;
      }
    }
  }
  lo0 {
    unit 0 {
      description RID;
      family inet {
        address 10.1.1.1/32;
      }
    }
  }
}
routing-options {
  static {
    route 0.0.0.0/0 next-hop 5.5.5.1;
  }
}
protocols {
  rip {
    group CE {
      export RIP-EXPORT;
      neighbor em3.0;
    }
  }
}
policy-options {
  policy-statement RIP-EXPORT {
    from protocol [ direct local ];
    then accept;
  }
}
```