1) Первоначальная настройка маршрутизаторов:

а) Настройка R1:

```
<R1>system-view
[R1]int gi 0/0/0
[R1-GigabitEthernet0/0/0]ip address 10.1.1.1 30
[R2-GigabitEthernet0/0/0]mpls
[R1- GigabitEthernet0/0/0]int gi 0/0/1
[R1-GigabitEthernet0/0/1]ip add 10.2.1.1 30
[R1-GigabitEthernet0/0/1]ospf cost 1000
[R1-GigabitEthernet0/0/1]mpls
[R1-GigabitEthernet0/0/1]quit
[R1]int LoopBack 1
[R1-LoopBack1]ip address 1.1.1.9 32
```

б) Настройка R2:

```
<R2>sys
[R2]int GigabitEthernet 0/0/0
[R2-GigabitEthernet0/0/0]ip address 10.1.1.2 30
[R2-GigabitEthernet0/0/0]mpls
[R2]interface gi 0/0/1
[R2-GigabitEthernet0/0/1]ip add 10.2.1.2 30
[R2-GigabitEthernet0/0/1]ospf cost 1000
[R2-GigabitEthernet0/0/1]mpls
[R2-GigabitEthernet0/0/0]quit
[R2]int loopback 1
[R2-LoopBack1]ip add 2.2.2.9 32
[R2-LoopBack1]quit
```

2) Настройка динамической маршрутизации:

а) Настройка R1:

```
[R1]ospf 1
[R1-ospf-1]area 0
[R1-ospf-1-area-0.0.0.0]network 1.1.1.9 0.0.0.0
[R1-ospf-1-area-0.0.0.0]network 10.1.1.0 0.0.0.3
[R1-ospf-1-area-0.0.0.0]network 10.2.1.1 0.0.0.3
```

б) Настройка R2:

```
[R2]ospf 1
[R2-ospf-1]area 0
[R2-ospf-1-area-0.0.0.0]network 2.2.2.9 0.0.0.0
[R2-ospf-1-area-0.0.0.0]network 10.1.1.0 0.0.0.3
[R2-ospf-1-area-0.0.0.0]network 10.2.1.0 0.0.0.3
```

3) Настройка MPLS

а) Настройка R1:

```
[R1]mpls lsr-id 1.1.1.9
[R1]mpls
Info: Mpls starting, please wait... OK!
[R1-mpls]quit
```

б) Настройка R2:

```
[R2]mpls lsr-id 2.2.2.9
[R2]mpls
Info: Mpls starting, please wait... OK!
[R2-mpls]quit
```

4) Статическая маршрутизация по меткам:

а) Настройка R1:

```
[R1]static-lsp ingress R1toR2 destination 2.2.2.9 32 nexthop 10.1.1.2 out-label 20
[R1]static-lsp egress R2toR1 incoming-interface GigabitEthernet 0/0/0 in-label 60
[R1]static-lsp ingress r1tor2 destination 2.2.2.9 32 nexthop 10.2.1.2 out-label 30
[R1]static-lsp egress r2tor1 incoming-interface GigabitEthernet 0/0/1 in-label 50
```

б) Настройка R2:

```
[R2]static-lsp egress R1toR2 incoming-interface GigabitEthernet 0/0/0 in-label 20
[R2]static-lsp ingress R2toR1 destination 1.1.1.9 32 nexthop 10.1.1.1 out-label 60
[R2]static-lsp egress r1tor2 incoming-interface GigabitEthernet 0/0/1 in-label 30
[R2]static-lsp ingress r2tor1 destination 1.1.1.9 32 nexthop 10.2.1.1 out-label 50
```

5) Протестируем, как быстро осуществится переход с одного MPLS-маршрута на другой при обрыве линка:

```
<R2>ping lsp -c 1000 ip 2.2.2.9 32
  LSP PING FEC: IPV4 PREFIX 2.2.2.9/32/ : 100  data bytes, press CTRL_C to
break
  Reply from 2.2.2.9: bytes=100 Sequence=1 time=16 ms
  Reply from 2.2.2.9: bytes=100 Sequence=2 time=12 ms
  Reply from 2.2.2.9: bytes=100 Sequence=3 time=12 ms
  Reply from 2.2.2.9: bytes=100 Sequence=4 time=11 ms
  Reply from 2.2.2.9: bytes=100 Sequence=5 time=10 ms
  Reply from 2.2.2.9: bytes=100 Sequence=6 time=21 ms
Jan   7  2001  15:25:01+00:00  R1   %%01IFPDT/4/IF_STATE(l)[36]:Interface
GigabitEthernet0/0/0 has turned into DOWN state.
<R1>
Jan   7  2001  15:25:01+00:00  R1  %%01IFNET/4/LINK_STATE(l)[37]:The  line
protocol IP on the interface GigabitEthernet0/0/0 has entered the DOWN state.
<R1>
Jan                7               2001              15:25:01+00:00              R1
%%01OSPF/3/NBR_CHG_DOWN(l)[38]:Neighbor  event:neighbor  state  changed
to  Down.  (ProcessId=1,  NeighborAddress=10.0.0.2,  NeighborEvent=KillNbr,
NeighborPreviousState=Full, NeighborCurrentState=Down)
<R1>
Jan                7               2001              15:25:01+00:00              R1
%%01OSPF/3/NBR_DOWN_REASON(l)[39]:Neighbor  state  leaves  full   or
changed to Down. (ProcessId=1, NeighborRouterId=10.0.0.2, NeighborAreaId=0,
NeighborInterface=GigabitEthernet0/0/0,NeighborDownImmediate
reason=Neighbor       Down       Due       to       Kill       Neighbor,
NeighborDownPrimeReason=Physical          Interface          State          Change,
NeighborChangeTime=2001-01-07 15:25:01)
<R1>
  Request time out
  Reply from 2.2.2.9: bytes=100 Sequence=8 time=11 ms
  Reply from 2.2.2.9: bytes=100 Sequence=9 time=11 ms
  Reply from 2.2.2.9: bytes=100 Sequence=10 time=78 ms
  Reply from 2.2.2.9: bytes=100 Sequence=11 time=21 ms
```

```
Reply from 2.2.2.9: bytes=100 Sequence=12 time=19 ms
Reply from 2.2.2.9: bytes=100 Sequence=13 time=18 ms


--- FEC: IPV4 PREFIX 2.2.2.9/32 ping statistics ---
13 packet(s) transmitted
12 packet(s) received
7.69% packet loss
round-trip min/avg/max = 10/20/78 ms
```

Потерян один пакет. Это означает, что переключение было осуществлено в пределах 20 миллисекунд.