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  - 
  - active-backup
  - IEEE 802.3ad (LACP)
  - balance-alb

. Astra Linux.

. VLAN VXLAN Astra Linux.

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Astra Linux Special Edition .10015-01 ( 1.7), .10015-10
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Astra Linux Special Edition .10265-01 ( 8.1)
Astra Linux Common Edition 2.12

() Ethernet . . . , () . () () bonding. :

| | | | | |
|---|---|---|---|---|
| balance-rr | 0 | ( round-robin) | | |
| active-backup | 1 | . (link down ..) ; | | |
| balance-xor | 2 | ( MAC-, IP- IP-). . | | |
| broadcast | 3 | ( ). | | |
| 802.3ad | 4 | Link Agregation Control Protocol, LACP — IEEE 802.3ad. | | |
| balance-tlb | 5 | , . | | |
| balance-alb | 6 | , . | | |

balance-rr, balance-xor broadcast (static port trunking).
802.3ad .
balance-alb , MAC-.

:

- **«-» (active-backup).** . , . ;
- **LACP.** . , IEEE 802.3ad.;
- **(balance-alb)**. . . ARP . bonding ARP , , MAC MAC , . MAC . (round-robin) .

, :

- networking. NetworkManager, , , ;

```
sudo nmcli con show
sudo nmcli con del "  1"
sudo nmcli con del "  2"
sudo ip address flush dev eth1
sudo ip address flush dev eth2
```

. Astra Linux;

- eth1 eth2;
- bond0.

1. ifenslave iperf :

```
sudo apt install ifenslave iperf
```

ifenslave , iperf , .

2. /etc/network/interfaces :

```
auto eth1 eth2 bond0
iface eth1 inet manual
iface eth2 inet manual
```

auto ( networking), manual , DHCP. . /etc/network/interfaces .

## active-backup

active-backup , .

10.1.1.2, - 10.1.1.3.

active-backup Astra Linux:

1. /etc/network/interfaces :

```
iface bond0 inet static
 address <_IP->
 netmask 255.255.255.0
 pre-up modprobe bonding mode=active-backup arp_interval=100 arp_ip_target=<IP-__>
 post-down rmmod bonding
 bond-mode active-backup
 bond-primary eth1
 bond-miimon 100
 bond-downdelay 200
 bond-updelay 150
 bond-slaves eth1 eth2
```

bond-downdelay bond-miimon.

<_IP-> IP- 10.1.1.2, - 10.1.1.3, <IP-__> - , 10.1.1.3, - 10.1.1.2;

2. :

```
sudo ifup bond0
```

active-backup:

1. iperf:

```
sudo iperf -s -i 1
```

:
-s - ;
-i - ( );

2. iperf:

```
sudo iperf -c <IP-__> -p 5001 -i 1 -n 100M -t 60
```

:
-c - ip- ;
-p - ;
-i - ( );
-n - ;
-t - ;

3. iperf ( 60 , ):

a. eth1 (.. ) , , - , (eth1) (eth2);
b. eth1, , , eth1 ( ).

## IEEE 802.3ad (LACP)

IEEE 802.3ad Astra Linux:

1. /etc/network/interfaces :

```
iface bond0 inet static
 address 192.168.0.1
 netmask 255.255.255.0
 bond-mode 802.3ad
 bond-miimon 100
 bond-downdelay 200
 bond-updelay 200
 bond-xmit-hash-policy 1
 bond-slaves eth1 eth2
```

bond-downdelay bond-miimon.

2. :

```
sudo ifup bond0
```

3. :

```
cat /proc/net/bonding/bond0
```

bond0 - . :

```
Bonding Mode: IEEE 802.3ad Dynamic link aggregation
Transmit Hash Policy: layer2 (0)
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 200
802.3ad info
LACP rate: slow
Active Aggregator Info:
Aggregator ID: 2
Number of ports: 2
Actor Key: 17
Partner Key: 13
Partner Mac Address: 00:14:a8:82:87:80
Slave Interface: eth0
MII Status: up
Link Failure Count: 1
Permanent HW addr: 00:30:48:59:e9:c6
Aggregator ID: 2
Slave Interface: eth1
MII Status: up
Link Failure Count: 0
Permanent HW addr: 00:30:48:59:e9:c7
Aggregator ID: 2
```

, cat /proc/net/bonding/bond0 «Bonding Mode: IEEE 802.3ad Dynamic link aggregation» , , «Slave Interface: eth0», «MII Status: up».

## balance-alb

balance-alb , .

QEMU/KVM , / (UP/DOWN), "Hipervisor default", rtl8139. .

balance-alb Astra Linux:

1. /etc/network/interfaces :

```
iface bond0 inet static
 address <_IP->
 netmask 255.255.255.0
 pre-up modprobe bonding mode=balance-alb
 post-down rmmod bonding
 bond-mode 6
 bond-miimon 100
 bond-downdelay 150
 bond-updelay 150
 bond-slaves eth1 eth2
```

<_IP-> IP- 10.1.1.2, - 10.1.1.3;

2. :

```
sudo ifup bond0
```

3. balance-alb:

   a. :

```
ip link show
```

```
...
3: eth1: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc
pfifo_fast master bond0 state UP mode DEFAULT group default qlen
1000
    link/ether 52:54:00:31:72:c7 brd ff:ff:ff:ff:ff:ff
4: eth2: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc
pfifo_fast master bond0 state UP mode DEFAULT group default qlen
1000
    link/ether 52:54:00:61:6b:17 brd ff:ff:ff:ff:ff:ff
5: bond0: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc
noqueue state UP mode DEFAULT group default qlen 1000
    link/ether 52:54:00:31:72:c7 brd ff:ff:ff:ff:ff:ff
```

, (UP) eth1 eth2, ( eth1) MAC- bond0 ( bold);

   b. ;

   c. :

```
ip link show
```

```
...
3: eth1: <NO-CARRIER,BROADCAST,MULTICAST,SLAVE,UP> mtu 1500 qdisc
pfifo_fast master bond0 state DOWN mode DEFAULT group default qlen
1000
    link/ether 52:54:00:61:6b:17 brd ff:ff:ff:ff:ff:ff
4: eth2: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc
pfifo_fast master bond0 state UP mode DEFAULT group default qlen
1000
    link/ether 52:54:00:31:72:c7 brd ff:ff:ff:ff:ff:ff
5: bond0: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc
noqueue state UP mode DEFAULT group default qlen 1000
    link/ether 52:54:00:31:72:c7 brd ff:ff:ff:ff:ff:ff
```

, eth1 , MAC- bond0 eth2.

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