Ad-hoc networking

An IBSS (Independent Basic Service Set) network, often called an ad-hoc network, is a way to have a group of devices talk to each other wirelessly, without a central controller. It is an example of a peer-to-peer network, in which all devices talk directly to each other, with no inherent relaying.

For example, ad-hoc networking may be used to **share an internet connection**.

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Requirements

- A **nl80211 compatible (https://wireless.wiki.kernel.org/en/users/drivers%7C)** wireless device (e.g. ath9k) on all devices which will connect to the network

Wifi link layer

Since IBSS network is a peer-to-peer network, the steps necessary to set up the wifi link layer should be the same on all devices.

Tip: It is possible to create complex network topologies, see **Linux Wireless documentation (http://wireless.kernel.org/en/users/Documentation/iw/vif)** for advanced examples.

Manual method

Warning: This method creates **unencrypted** ad-hoc network. See **#WPA supplicant** for method using WPA encryption.

See **Wireless network configuration#Manual setup** for a better explanation of the following commands. Make sure that **iw (https://www.archlinux.org/packages/?name=iw)** is **installed**.

Set the operation mode to ibss:

```
# iw interface set type ibss
```

Bring the interface up (an additional step like `rfkill unblock wifi` might be needed):

```
# ip link set interface up
```

Now you can create an ad-hoc network. Replace *your_ssid* with the name of the network and *frequency* with the frequency in MHz, depending on which channel you want to use. See the Wikipedia page **List of WLAN channels** for a table showing frequencies of individual channels.

```
# iw interface ibss join your_ssid frequency
```

WPA supplicant

Ensure that **wpa_supplicant (https://www.archlinux.org/packages/?name=wpa_supplicant)** is **installed**, and create a configuration file for it (see **WPA supplicant** for details).

/etc/wpa_supplicant-adhoc.conf

```
ctrl_interface=DIR=/run/wpa_supplicant GROUP=wheel

# use 'ap_scan=2' on all devices connected to the network
# this is unnecessary if you only want the network to be created when no other networks are available
ap_scan=2

network={
    ssid="MySSID"
    mode=1
    frequency=2432
    proto=RSN
    key_mgmt=WPA-PSK
    pairwise=CCMP
    group=CCMP
    psk="secret passphrase"
}
```

Run *wpa_supplicant* on all devices connected to the network with the following command:

```
# wpa_supplicant -B -i interface -c /etc/wpa_supplicant-adhoc.conf -D nl80211,wext
```

Network configuration

The final step is to assign an IP address to all devices in the network. There are multiple ways to do this:

- Assign static IP addresses. See **Network configuration#Static IP address** for details.

- Running DHCP server on one device. See **dhcpd** or **dnsmasq** for details.
- Running *avahi-autoipd*. See **Avahi#Obtaining IPv4LL IP address** for details.

If you want to share an internet connection to the ad-hoc network, see **Internet sharing**.

Tips and tricks

Using NetworkManager

If you use **NetworkManager**, you can use *nm-applet* for ad-hoc network configuration instead of the manual method described above. See **NetworkManager#Ad-hoc** for details.

Note: NetworkManager does not support WPA encryption in ad-hoc mode.

Custom systemd service (with wpa_supplicant and static IP)

You can use the following templates to enable wireless ad-hoc networking:

```
/etc/conf.d/network-wireless-adhoc@<interface>
```

```
addr=192.168.0.2
mask=24
```

```
/etc/systemd/system/network-wireless-adhoc@.service
```

```
[Unit]
Description=Ad-hoc wireless network connectivity (%i)
Wants=network.target
Before=network.target
BindsTo=sys-subsystem-net-devices-%i.device
After=sys-subsystem-net-devices-%i.device

[Service]
Type=oneshot
RemainAfterExit=yes
EnvironmentFile=/etc/conf.d/network-wireless-adhoc@%i

# perhaps rfkill is not needed for you
ExecStart=/usr/bin/rfkill unblock wifi
ExecStart=/usr/bin/ip link set %i up
ExecStart=/usr/bin/wpa_supplicant -B -i %i -D nl80211,wext -c /etc/wpa_supplicant-adhoc.conf
ExecStart=/usr/bin/ip addr add ${addr}/${mask} dev %i

ExecStop=/usr/bin/ip addr flush dev %i
ExecStop=/usr/bin/ip link set %i down

[Install]
WantedBy=multi-user.target
```

See also

- **Ubuntu community wiki WifiDocs/Adhoc (https://help.ubuntu.com/community/WifiDocs/Adhoc)**
- **Manual about creating an Ad-Hoc network on UbuntuGeek (http://www.ubuntugeek.com/creating-an-adhoc-host-with-ubuntu.html)**
- **Share your 3G Internet connection over wifi (http://go2linux.garron.me/linux/2011/03/share-your-3g-internet-connection-over-wifi-linux-ipod-touch-925)**

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