mint command (TDMA version)

- **Description**

 This document describes the "mint" command in version of the WANfleX software with the TDMA technology support.

 The MINT (Mesh Interconnection Networking Technology) architecture gives a functionality to present a radio interface of a unit (as well as a network connected to it) as a traditional Ethernet in a bus topology. Therefore a unit can have several Ethernet interfaces and several pseudo-interfaces (tun, ppp, null etc). Any of Ethernet interfaces can be united in bridging groups which consist of two or more interfaces to increase link capacity. Moreover, routing mode can also be used.

 **Syntax:**

```
mint IFNAME -type {mesh | master | slave}
mint IFNAME -mode {mobile | nomadic | fixed}
mint IFNAME -nodeid NUMBERID
mint IFNAME -name NAME
mint IFNAME -netid NUMBER
mint IFNAME -key SECRETKEY
mint IFNAME -authmode {public | static | remote}
mint IFNAME -[no]scrambling
mint IFNAME -[no]authrelay -[no]snmprelay
mint IFNAME -[no]replicate [$ACL]
mint IFNAME -[no]swborder
mint IFNAME -tpcmin {dBm|default} -tpcmax {dBm|default} -tpcadj {+/-dBm|default}
mint IFNAME -ratefall 0..8 [0]
mint IFNAME -[no]idfs
mint IFNAME -[no]autobitrate [+/-DB] | -fixedbitrate
mint IFNAME -minbitrate N
mint IFNAME -extracost N -fixedcost N -joincost N -meshextracost N
mint IFNAME -maxlinks N
mint IFNAME -mulcast [0..5]
mint IFNAME -loamp N -hiamp N
mint IFNAME -hierr N (default 5)
mint IFNAME -[no]log [detail]
mint IFNAME [-]failover {MAC|auto}
mint IFNAME -roaming {leader | enable [multiBS] [global] | disable}
mint IFNAME profile N [-freq X[,Y,N-M,...] | auto] [-sid X[,Y,..]]
               [-band NN] [-bitr NN|max] [-miso | -mimo [greenfield | legacy]]
               [-type {master|mesh|slave}] [-key XXX] [-nodeid N]
               [{-minbitr XXX [-autobitr [+/-dB]] | -fixedbitr})
```
mint IFNAME addnode [-defgw X.X.X.X] [-defmask X.X.X.X]
| -maxmcs N]
   [-lip X.X.X.X] [-tip X.X.X.X] [-mask X.X.X.X]
   [-lgw X.X.X.X] [-tgw {X.X.X.X | none}]
   [-lcost N] [-tcost N] [(-setpri | -addpri) NN | -1]
   [-disable | -enable | -delete]
mint IFNAME delnode -mac X:X:X:X:X:X

mint IFNAME rcmd (-n ADDR | -all | -peer) [-self] [-key KEY] [-t] [-quiet]
   [-mask 1,2..16] "Command" | -file URL
mint rcmdserver -guestKey STRING -fullKey STRING [-mask 1,2..16]

mint IFNAME -odr hub
mint IFNAME -odr spoke [[-]connected [$ACL]] [[-]kernel [$ACL]]
mint IFNAME -odr disable | show

mint join IFNAME1 IFNAME2 ...
mint disjoin

mint IFNAME monitor [-s] [-i SEC] [MAC [MAC ...]] | -[no]audio [full]
   [-mac MAC]
mint IFNAME -airupdate {disable | {[active|passive]|force}}
   [fast|normal|slow]
   [-f ftp://user:pass@host/path/file]

mint IFNAME map [routes | full | swg] [-detail] [-a] [-m]
mint IFNAME snap[shot] {list | save N ["Comment"] | diff N | del N | fix N MAC}
mint -[no]colormap
mint IFNAME ping [-n MAC] ... [-s LEN] [-swg N] [-p PRIOR] [-i]
mint IFNAME info MAC
mint IFNAME -cluster N NAME

mint IFNAME tdma mode=Master win=N dist=N dlp=N rssi=-N [-awc
   [-]turbo
mint IFNAME tdma mode=Master hold=N bfreq=F 0
mint IFNAME tdma mode=Slave
mint IFNAME tdma start | stop

mint IFNAME start | stop | restart | clear
### Parameters

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<th>Parameters</th>
<th>Description</th>
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<tbody>
<tr>
<td>IFNAME</td>
<td>Name of the network interface to which commands are referred.</td>
</tr>
<tr>
<td>-type (mesh</td>
<td>master</td>
</tr>
<tr>
<td>-mode (mobile</td>
<td>nomadic</td>
</tr>
<tr>
<td>-nodeid NUMBERID</td>
<td>Sets a node identifier. By default, it is set equal to the device’s serial number. The number may be specified in the &quot;XXX.YYY&quot; format reflecting a part of the IP address (both &quot;XXX&quot; and &quot;YYY&quot; numbers can range from 1 to 255). This optional parameter simplifies the identification of the node.</td>
</tr>
</tbody>
</table>

**NOTE**  <br> The "XXX.YYY" format is displayed only if the device's own identifier is also specified in this format. Thus, if you set an identification number in the "XXX.YYY" format at the base station, then the neighbors identifiers will also be shown in this format (no matter how they are defined on the neighboring devices).

| -name NAME        | Sets a name for the node. This node name will be displayed in the "mint map" set of commands. A node name should not exceed 16 characters. Spaces in the node name are accepted if placed in quotes. |
| -netid NUMBER     | Sets a network system identifier (up to 8-digit HEX figure). It must be the same at both ends of the link.                                                                                                    |
| -key SECRETKEY    | Sets a secret key for the current node. The key can be up to 64 characters long and should not contain spaces (or should be placed in quotes). Authentication modes are described by parameters below. |
-authmode {public | static | remote}  
Sets the type of nodes authentication. There are three types of nodes authentication available.  

- "public" – all nodes have the same key (password) for access. It is the simplest case of authentication. It can be used for small workgroups, point-to-point connections, mass public access networks and for MINT architecture testing purposes. Any two nodes of the network can establish a connection (when other settings are suitable) if their keys are equal. In the public mode, when found a potential neighbor a node check for its info in the local database (defined by "mint IFNAME addnode" command). If requested information is found, a key from a local database will be used. Otherwise, it is assumed that neighbor’s key corresponds with node’s own key ("mint IFNAME –key" parameter).  
- "static" – every node has a full list of nodes (including their parameters and access keys) with which a connection can be established. This mode is suitable for an autonomous area of service with no need of centralized management and monitoring. Obviously, nodes that are included in each others access lists (local databases) should have a physical ability to connect to each other in order to establish a connection. In static mode each node must have a list of all permitted neighbors in a local database formed by a set of "mint IFNAME addnode" commands. If no information on the neighbor is found in the database the connection is being rejected.  
- "remote" – centralized authentication mode with remote server. In this mode any node can request the information from a remote authentication server. This means that the node must have an access to this server (e.g. using IP).

-[no]authrelay  
By this parameter a node having a local database of its neighbors or having an access to a remote authentication server can be configured as an authentication relay. The information about authentication relay will be automatically distributed throughout the MINT network. Nodes which use "remote" mode of authentication but both do not have access to the remote server and do not have the information in their local database will use authentication relay in order to obtain the keys of potential neighbors.

-[no]snmprelay  
A node becomes an SNMP relay. The information about SNMP relay will be automatically distributed throughout the MINT network.

-[no]scrambling  
Enables/disables the data scrambling to improve the connection stability. By default is enable.

-[no]replicate [ACL]  
Allows to make "isolation" of wireless subscriber stations from direct exchange of information with each other in switching mode. If this option is enabled on the base station then the traffic entering into a wireless network from wired segment of a subscriber station and coming to the base station from this subscriber station won’t be transmitted back to the wireless segment by the base station. It may return to the wireless segment only through an external wired switchboard connected to the base station. By default an exchange is enabled.  
In addition $ACL list of "num" type may be specified (acl add $ISOLATE num N1 N2 ...) with a list of switch group’s numbers for which you should enable or disable the listed feature (for all by default).

NOTE  
This feature applies only to traffic entering a wireless network from the wired segment of a subscriber station. Inside a wireless network nodes are all accessible to each other at all times.

-[no]swborder  
Enables/disables the "Switch border" regime. In this mode a node becomes "border" between MINT domains, it stops the exchange of information about switching groups and whole data exchange between these domains, but all capabilities of MINT protocol can still be used (obtaining information about the whole MINT network, remote command implementation and so on).

-tpcmin {dBm|default} -tpcmax {dBm|default} -tpcadj {+/-dBm|default}  
Allow to manage ATPC (Automatic Transmit Power Control) function behavior. ATPC function is enabled/disabled by the "rfconfig <interface> pwrctl" command.  
- "tpcmin dBm" – sets the minimal transmit power level in dB which ATPC function is allowed to set on the radio interface.  
- "tpcmax dBm" – sets the maximal transmit power level in dB which ATPC function is allowed to set on the radio interface.  
- "tpcadj +/-dBm" – influences the optimal power level to be set on the radio interface by the ATPC function. The ATPC can be forced to set higher (tpcadj + <number in dBm>) or lower (tpcadj - <number in dBm>) power levels compared to the values it estimates itself.

-hierr N  
Sets the percentage of retries after which the system will change the modulation to the lower value. By default is 5.
mint IFNAME [-no]autobitrate [+/-DB] [fixedbitrate]

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- **"-[no]autobitrate"** – enables/disables an automatic speed management mode. In autobitrate mode every device controls the connection parameters independently (amplitude of the received signal, number of ARQs on transmitting, errors, SNR on the opposite side etc) and chooses such transmitting speed which provides necessary conditions for a reliable work with minimum number of ARQs and losses. Speed values can be different for each direction but it will be optimal. When no autobitrate is used transmitting speed will be set according to the setting of "bitr" parameter of the "rfconf" command. When autobitrate is used, transmitting speed will be automatically adjusted according to current link conditions. The ranges of speed will be in between the setting of "bitr" parameter (maximal speed) and "minbitrate" parameter (see below). If no "minbitrate" is specified the minimal RF interface speed will be taken as a lowest possible transmitting speed. "+/-DB" option influences the autobitrate function sensitivity. Autobitrate can be forced to set a higher bitrate (mint IFNAME –autobitrate -<number in dB>) even if the signal level is lower than expected on the specified number of dB. Or not to set a higher bitrate (mint IFNAME –autobitrate +<number in dB>) till the signal level won’t become higher than expected on the specified number of dB.

- **"fixedbitrate"** – disable the "autobitrate" mode. In the fixedbitrate mode the actual bitrate is set with the "bitr" parameter of the "rfconf" command.

-minbitrate N

Sets minimal transmitting speed for "autobitrate" mode.

-ratefall 0..8 [0]

Allows to influence autobitrate mechanism in the following way: it sets upper bitrate index threshold below which errors and retries checks are not performed, just energetic ability to upper bitrate is taken into consideration. Bitrate indexes are from 1 to 8 and correspond with bitrates available on the device’s radio interface (to see bitrate list use the "rf rfx cap" command). "0" ratefall’s value cancels the command.

-[no]dfs

Enables/disables the Instant DFS function.

-[meshextracost N] [-extracost N] [-fixedcost N] [-joincost N]

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- **"extracost N"** – sets an extra cost for all connections on this interface. The value of the parameter is added to the cost automatically calculated by MINT protocol. Value of this parameter can only be positive. Zero value disables the parameter.

- **"meshextracost N"** – sets an extra cost for all connections of master node with its mesh nodes. By default is 500.

- **"fixedcost N"** – all costs for all units connections will be set as the value specified in this parameter (exclude join). Zero value disables the parameter.

- **"joincost N"** – sets a cost for all "join" connections on this interface (by default is 3). Zero value disables the parameter.

-maxlinks N

Sets the maximum allowed number of simultaneously connected CPEs (radio connections). When this value is reached, other attempts to connect to the base station will be rejected.

-mulcast [0..5]

Makes the transformation of multicast traffic to unicast.

If two or more clients are subscribed to the same multicast stream, a copy of the original stream will be sent to each of them in unicast mode. This parameter limits the number of subscribers for which this transformation can be performed. If the limit is not specified, the transformation is always performed. A "0" value disables the transformation to unicast.

**NOTE**

Transformation into unicast requires copy of data by the memory, it increases the CPU load of the device. Furthermore, for each of the new unicast streams a certain percentage of attempts may be required that increases traffic even more.

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</table>

- **"[0..5]"** – the number of subscribers. Zero value disables the parameter. If value is not specified the transformation is always executed. By default is 3.

-failover MAC|auto

Allows to backup the main communication channel, which can be organized on third party manufacturers equipment. Communication is established between Master and Slave devices via the radio and at the same time using the pseudo-radio interface, through the main communication channel. The Master device with enabled "failover" function checks the availability of the MAC address of the remote device through the primary channel. If the address is available, an operation of the backup channel (radio) is blocked. If the address of the Slave device disappears in the primary channel, the backup channel is unlocked and traffic starts to flow over it, until the MAC address of the remote node is available through the primary channel again.

If the primary channel is created by InfiNet devices, same as backup, then not only the presence / absence of an alternative link with the monitored node will be taken into account but also the cost of this connection. In this case, the device that provides the lowest cost of communication (best quality) through the radio will become the main one, the second device will turn off its transmitter and go into standby mode.

More information about settings of this function is in the paragraph "Examples".
[-loamp N] [-hiamp N]  
- "loamp" – sets the minimal signal level for the neighbor. Signal level is measured in dB above the noise threshold for the current bitrate. If the level gets lower than specified value the connection with a neighbor will be lost. Default value is 2.
- "hiamp" – sets the minimal SNR for a new neighbor. Signal level is measured in dB above the noise threshold for the current bitrate. If neighbor’s signal level is equal or higher than a specified value the node will consider this neighbor to be a candidate. Default value is 6.

monitor [-s] [+ SEC] [MAC [MAC ...]]  
If a MAC address is not specified then all neighbors and candidates of this node will be monitored. The "nodeid" and name of node are permitted to use instead of MAC addresses.
- "-s" – disables the line output mode (output on one screen).
- "+ SEC" – sets the interval for information updating.

start | stop | restart | clear  
Starts/stops/restarts/clears the MINT configuration for the specified interface.

-[no]log [detail]  
Allows to control logging settings for MINT protocol. Three different modes are available:
- "-nolog" – logging is disabled.
- "-log" – limited logging. The messages about connected/disconnected neighbors will be put to the system log.
- "-log detail" – detailed logging. Along with the messages from limited logging mode, messages about changed costs of the routes and changed bitrates (in autobitrate) mode will be put to the system log.

join IFNAME1 IFNAME2 ...  
The capability to join two or more interfaces of one device in one "mesh" network is an important function of MINT architecture. There is no differences in the settings of these interfaces and protocols which can limit association. This way radio and pseudo radio interfaces can be associated.

NOTE  
If several interfaces are combined by the "join" function, only one of them (any) need to be included in the switching group.

disjoin  
Disjoins interfaces and make them independent.

Frequency roaming

-roaming [leader | enable [multiBS] [global] | disable]  
For a flexible management of frequency resource, higher noise immunity and throughput optimization InfiNet Wireless equipment supports frequency roaming capability based on MINT protocol. Roaming is turned off by default – that means that the unit works using fixed radio interface configuration.
- "leader" – define required radio frequency parameters of the wireless network. "Roaming leader" also works with a fixed radio interface parameters, however its radio parameters configuration is transmitted over the network in special packets so every node of the network knows whether it is connected to the "roaming leader" or to the network that has a roaming leader. If the network has several "roaming leaders", their parameters should be identical. "Roaming leader" also supports DFS and Radar Detection features (if a special license is installed for selected countries).
- "enable" – other network nodes can use roaming in order to search for the "roaming leader" or the network having a "roaming leader" (roaming enable). The search is implemented by switching between different sets of radio parameters that are defined in profiles. Each profile contains a fixed set of radio interface parameters which are set on each iteration of the search. Heuristic search algorithm can quickly evaluate general air media parameters and chooses the profile which defines the most suitable network.
- "multiBS" – enables the slave node to constantly check the link quality and try to find another BS if the quality become worse. When the parameter is disabled then if the link breaks the node will firstly try to reconnect to the same BS regardless of the link quality.
- "global" – if enable, device should search and connect only to a network which has one or more global roaming leaders. It helps to prevent the creation of locally closed segments that are separated from the main network. Any MINT device (including InfiMUX) that has direct access from the control center or has access to the Internet can be assigned as a leader.
### Remote Command Management

#### Local Nodes Database

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<tr>
<td><code>addnode</code></td>
<td>Allows to create the local devices database with which this node can establish connections.</td>
</tr>
<tr>
<td><code>-defgw</code></td>
<td>Sets default gateway IP address.</td>
</tr>
<tr>
<td><code>-defmask</code></td>
<td>Sets default mask.</td>
</tr>
<tr>
<td><code>-mac</code></td>
<td>Node MAC address with which connection can be established.</td>
</tr>
<tr>
<td><code>-key</code></td>
<td>Unique device key. Key word or phrase up to 64 characters long. Used in authentication procedures. The same key should be specified in the connecting device settings.</td>
</tr>
<tr>
<td><code>-lip</code></td>
<td>Local IPv4 address. This address will be assigned to this device when the connection with a remote is established.</td>
</tr>
<tr>
<td><code>-tip</code></td>
<td>Target IPv4 address. Will be assigned to the remote node once connection is established.</td>
</tr>
<tr>
<td><code>-nodeid</code></td>
<td>Node ID.</td>
</tr>
<tr>
<td><code>-setpri</code></td>
<td>Sets priority of packets passing through to the specified node.</td>
</tr>
<tr>
<td><code>-addpri</code></td>
<td>Increases priority of packets passing through to the specified node.</td>
</tr>
<tr>
<td><code>-delete</code></td>
<td>Deletes a device record with a corresponding MAC address from the local database.</td>
</tr>
</tbody>
</table>

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<tbody>
<tr>
<td><code>delnode</code></td>
<td>Deletes a device record with a corresponding MAC address from the local database.</td>
</tr>
</tbody>
</table>

#### Managing roaming profiles.

- "N" – profile ID, any non-zero positive number.
- "freq X,Y,N-M,... | "auto" – radio interface center frequency or list of frequencies. "Auto" – all frequencies that the unit supports will be used.
- "sid X,Y,N,..." – SID of the radio interface.
- "bitr NN|max" – bitrate of the radio interface. Acts as a top limit for the bitrate if "autobitr" mechanism is turned on.
- "band NN" – defines the channel width for the profile. If profiles use different channel widths, "auto" mode for frequency cannot be used.
- "type [master | mesh | slave]" – node type.
- "key XXX" – secret key.
- "nodeid N" – node ID.
- "fixedbitr" – sets fixed bitrate for the node.
- "minbitr XXX" – minimum bitrate for operation in "autobitr" mode.
- "autobitr [+/-dB]" – operation mode with automatic bitrate control. "[+/-dB]" – allows to manage bitrate control sensitivity.
- "enable | disable | delete" – enables, disables or deletes the profile.
- "-miso | -mimo" – sets a signal coding method: MIMO or MISO.
- "greenfield" – enables/disables the "Greenfield" mode. Greenfield mode is an operational mode which can be enabled on 802.11n-based device which reduces transmitted frame size by removing legacy (pre-802.11n) field from a frame header. By enabling Greenfield mode on an InfiNet unit, you can achieve up to 15% increase in performance. Also, this mode allows to avoid processing and decoding others "noise" preambles resulting in the better signal quality of a link.
- "legacy" – disables the "Greenfield" mode.

### Remote Command Management
Remote command management allows one MINT node to perform commands on one other or all MINT nodes in the network.

- `-n ADDR | all` – destination node MAC address or all MINT nodes.
- `-peer` – performs commands only on the nodes that is connected to the given device directly.
- `-self` – executes commands sent on the device itself, but only if the command has been executed by all remote nodes. "2" – the command will be executed by the device even if one of the remote nodes has not confirmed the command execution.
- `-key KEY` – access key to the nodes with enabled remote control commands.
- `-t` – activates the information display on the screen, not in the system log. The parameter works only if the request is sent to a certain number of devices, so the number of responses that must be received are known in advance.
- `-quiet` – disables writing replies from the remote devices to the system log.
- `-mask 1,2..16` – allows to assign up to 16 arbitrary classification attributes. For example, MUX-1, BS-2, CPE-3, PTP-4, PTMP-5, MIMO-6, Master-7, Slave-8, etc. These attributes are used when the command executing "mint rcmd" to restrict the action of the command only those devices that have the specified attribute (mint rf rcmd-all-mask 3.8 " sys vers x ").

Disables/enables remote control management mode (enabled by default).

Sets the device as a spoke. Allows to specify a list of IP addresses/networks using the Access Control List.

Sets the device as a hub.

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Over-the-air Firmware Update

The "air update" system allows to facilitate the task of the firmware mass upgrade in the MINT network, which includes a large number of similar devices. It is enough to update the firmware manually (or via the task scheduler) only on one device (of each type), the other devices will be updated automatically.
Title

- `airupdate {disable | {active|passive|force}} [fast|normal|slow] [-f <ftp://user:pass@host/path/file>]`

  "fast", "normal" and "slow" – information management accumulation period. "passive normal" mode is enabled by default.

  - In the "fast" mode the device will monitor the selected source, waiting for the moment when it will work with the proposed version for at least 2 hours without reboots, and only then send a request for an update.
  - In the "normal" mode the waiting period is 7 hours.
  - In "slow" – 24 hours.

  Each device can be configured to use either active or passive update mode. Active devices periodically (every half an hour) announce to the MINT network information about the firmware they have, its version and the time of continuous (without reboots) work with this version. All MINT network devices (both active and passive) accept and store information from active devices, selecting the sources that offer the most recent version and work with it for the longest time. After a period of information accumulation, the devices send their requests for a new version to the most appropriate source. Active devices collect requests, group them and send a new version simultaneously to all subscribers using a special protocol of MINT-MTP multicast distribution.

  - "force" – used for emergency firmware updates. This command is direct action, it is not saved in the configuration, but serves as a signal for all devices to immediately send their requests for updates regardless of the operation mode and without waiting for the end of the information accumulation period.
  - "-f" – specifies the path to the ftp server from where the device will download updates.

  If the firmware is sent to a group of subscribers and the transmission fails, or the connection between the source and the subscriber is lost, the subscriber will stop receiving the update and will repeat the request when receiving the next announcements until the update is successfully completed.

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Current Connections Information

`info MAC`

Displays information about the "MAC" node status and the traffic route to this node.

`ping [-n MAC] ... [-s LEN] [-swg N] [-p PRIOR] [-i]`

Sends test packets from the network interface. The command result is reflected in the system log. If the network node MAC address is not specified, the test packet will be sent to all network nodes in "reliable multicast" mode. It should be noted that in contrast to the well-known network utility "ping", the command "mint ping" receives only delivery confirmation, not return packets from the tested network nodes. The main goal of the command is to check the reachability of all (or some) network nodes and get an idea of the quality of the selected delivery routes.

  - "-n MAC" – specifies the network node MAC address to which test packets should be sent, multiple addresses can be specified.
  - "-s LEN" – test packet size in bytes.
  - "-swg N" – sends the test packet from the interface to the switching group "N".
  - "-p PRIOR" – sets the packet priority from 0 to 16.
  - "-i" – displays additional information.

`map [routes | full | swg] [detail] [-a] [-m]`

The parameter is used to get information about the current links of this node. Without arguments, displays information about the MINT network neighbor nodes.

  - "routes" – displays information about the MINT network routes.
  - "swg" – used in the case when switching groups are used. Displays information about the current connections of this node in the context of the switching groups created in the network. It shows in which groups the nodes are neighbors.
  - "full" – the previous two arguments combined output.
  - "detail" – for each individual connection to the neighbor node, displays information about the distance to the node, the download of the up and down links, the connection cost, the main neighbor node IP address.
  - "-m" – displays input/output signal levels relative to the minimum rate. By default, it is displayed relative to the current rate.
  - "-a" – displays only the active (connected) neighbors, without candidates, applicants and static links.

`snapshot [list | save N ["Comment"] | diff N | del N] [fix N MAC]`

Allows to save data about MINT network neighbor nodes to the device memory that allows to compare its state in future.

  - "list" – displays the list of the previously save records, maximum 8.
  - "save N ["Comment"]" – saves data about current device links, "N" – save number in the range from 1 to 8, "Comment" – text comment.
  - "diff N" – displays the differences between the current state of the neighbor nodes and the state saved under the number "N".
  - "del N" – deletes the save with the specified number.
  - "fix N MAC" – allows to add or remove the device with the specified MAC address from the saved data under the number "N".
|-no|colormap| Displays information about the current connections of this node in the same way as the "map" parameter, applying to the neighbors the color indication depending on the signal level between the current device and the neighbor node, as well as the number of retries and transmission errors.

-cluster N NAME| Allows to combine devices that are in close proximity to each other to the single cluster for easy display on the map.
- "N" – cluster sequence number.
- "NAME" – cluster name.

TDMA Parameters Setting

```
tdma mode=Master win=N dist=N dlpt=N|0 rssi=-N [-]awc [-]turbo
```
Sets the device operating mode (Master or Slave).
- "win" – frame size in milliseconds, the range is from 2 to 10.
- "dist" – maximum operational distance in kilometers, the range is from 1 to 100.
- "dlp" – quota of the radio frame for uplink and downlink traffic in percentage "N|0". The range is from 20 to 80. Value "0" (zero) means flexible quota management depending on the traffic load in one or another direction.
- "rssi" – maximum signal level of the subscriber terminal, measured at the master device input. The range is from -90 to -20 dBm.
- "[-]awc" – automatic frame size management.
- "[-]turbo" – increases the average throughput in case of link degradation due to errors in the radio. The sliding window of the ARQ algorithm are extended from three to five frames, which increases its efficiency.
- "[-]scs" – in case of retries, increase throughput and reduce latency. In this mode, ACKs are sent in the same frame as the transmitted data, thus it is most effective in point-to-point mode.

```
tdma mode=Master hold=N|0 bfreq=F|0
```
- "hold" – standalone downtime in case of external synchronization unit disable, in seconds. Value "0" (zero) disables this parameter control, command to work nonstop is set.
- "bfreq" – backup frequency to which the device will switch in case of synchronization loss.

```
tdma start | stop
```
Starts/stops TDMA mode on the radio interface.

Examples

Nodes A and B use the same key and can connect to each other in "public" mode.

**Node A:**
```
mint rf5.0 -key SECRETKEY mint rf5.0 -authmode public
```

**Node B:**
```
mint rf5.0 -key SECRETKEY mint rf5.0 -authmode public
```
Nodes A and B use different access keys, but can connect to each other in "public" mode using local databases.

Node A:

```bash
mint rf5.0 -key SECRETKEY mint rf5.0 -authmode public mint rf5.0
addnode -mac B:B:B:B:B:B -key KEY2
```

Node B:

```bash
mint rf5.0 -key KEY2 mint rf5.0 -authmode public mint rf5.0 addnode
```

In this case, each node can additionally establish links with other nodes operating in the "public" mode, if their keys match the node's own key.

Node A uses a local database and acts as an authentication gateway. Node B does not have its own database and uses authentication gateway services in "remote" mode.

Node A:

```bash
mint rf5.0 -key KEY1 mint rf5.0 -authmode static mint rf5.0 -authrelay
mint rf5.0 addnode -mac B:B:B:B:B:B -key KEY2 mint rf5.0 addnode -mac
:::-- -key KEY3
```

Node B:

```bash
mint rf5.0 -key KEY2 mint rf5.0 -authmode remote
```

Node B will receive neighbor information through the authentication gateway (node A).

In order to simplify the base station sector configuration in the static description of the subscribers, the command "mint addnode" will add with two parameters "-defgw X.X.X.X" and "-defmask X.X.X.X".

```bash
mint rf5.0 addnode -mac 000028BAF234 -lip 1.1.1.1 -tip 1.1.1.2 -mask
255.255.255.252 -lcost 120
```

If the description of the particular subscriber does not specify the exact gateway address or network mask, the default values set in these parameters will be used. Thus, for each subscriber it is enough to specify only dynamically assigned IP address and access key.

```bash
mint rf5.0 addnode -mac 000435567322 -tip 10.1.1.1 -key SecretKey1
```

If no access key is specified, it is assumed that it matches the base station key. If no IP address is specified, no action is taken on the addresses.

**CAUTION**

Information about the default gateway (which is defined by the "addnode-tgw / addnode -defgw" commands) is not passed to the host unless it has specified an address and a network mask.
The command removes the network node with the MAC address "00:00:28:BA:F2:34" from the local database.

```
mint rf5.0 delnode -mac 000028BAF234
```

The command sends remote commands to all devices on the MINT network: display device configuration (in the first case), upload command file from ftp (in the second case).

```
mint rf5.0 rcmd -n all -cmd "co sh" mint rf5.0 rcmd -n all -file ftp_name:ftp_pswd@192.168.100.21/1.txt
```

Enables detailed logging for interface "rf5.0".

```
mint rf5.0 -log detail
```

The command displays data for monitoring signal levels.

```
mint rf5.0 monitor
```

The input/output signal levels are displayed relative to the minimum rate for receiving/transmitting.
The device is in active mode, sending out announcements about its firmware version. If other active devices with a newer firmware version are found on the network, the update request will be sent no earlier than 7 hours of continuous operation of the announcement source.

```
mint rf5.0 -airupdate active normal
```

The device passively listens to the network, collects information about announcements and waits for the moment when the source with the new firmware version will work with it for at least a day.

```
mint rf5.0 -airupdate passive slow
```

The operator decides to replace the firmware on the network with a new, obviously proven one.

```
mint rf5.0 -airupdate force
```

This device does not participate in the automatic update system, does not generate and does not listen to announcements.

```
mint rf5.0 -airupdate disable
```

The operator specifies the path to the ftp server from where the device will download updates.

```
mint rf5.0 -f ftp://user:pass@host/path/file
```
Let’s make a link reservation. To do this, create a pseudo-radio interface on each device via Ethernet (or vlan). In this case, both devices will communicate with each other via "PRF" interfaces using the main link.

```bash
ifconfig prf0 up prf 0 parent eth0 mint prf0 start
```

On both devices join the "rf5.0" and "prf0" interfaces with the "join" parameter.

```bash
mint join rf5.0 prf0
```

Both devices must have at least one switching group between ETH and RF interfaces, which will provide L2 traffic transmission for the time of the main link absence.

```bash
switch group 1 add eth0 rf5.0 switch group 1 start switch start
```

**CAUTION**

In case the InfiNet Wireless devices are used for the redundant link, it is recommended to use own switching group on each link.

In case it is necessary to use one switching group, "rf5.0" and "prf0" interfaces can not be joined with the "join" parameter. Also, it is necessary to explicitly specify the MAC address of the remote device, since the "auto" option will not work.

The "failover" function is enabled on the Master radio interface.

```bash
mint rf5.0 -failover auto
```

As soon as the Master detects that the monitored MAC address is accessible via the "prf0" interface, it will immediately turn off its radio transmitter and put the radio interface into the DOWN state, simultaneously stopping the traffic switching. Having lost synchronization on the radio with the Master, Slave will stop transmitting and go into a standby mode.

If the connection to the MAC address being monitored is lost, for example, if the main link fails, the Master will turn on its transmitter and put the radio interface into the UP state. The Slave detects the presence of a signal from the Master and go into a mode of communication. The client traffic will start to be transmitted over the radio again.