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"Automatic Establishment of IP Connectivity for Automated Base Transceiver Station Commissioning and Recovery"

The visit of a Base Transceiver Station (BTS) site is usually required during rollout after the BTS installation, in order to perform commissioning tasks. But also in the normal operation phase, annoying site visits are sometimes necessary when the remote management connection has been lost for some reason, e.g. because of an unintended misconfiguration leading to the breakup of the management connection, or because of a software malfunction. Since only skilled maintenance personnel can do on-site commissioning or reconfiguration, a reduction of such site visits would reduce the operator's OPEX considerably.

The assumed Radio Access Network (RAN) topology is a Radio Network Controller (RNC), to which BTSs are connected in a tree-like manner. There is an IP-based management network with IP routing functionality in RNC and in each BTS. Each BTS has a (small) IP subnet. Via the RNC, a BTS has connectivity to a Network Operation Center, in which a configuration server is located. The configuration server contains BTS-specific configuration files, which are a result of network planning.

When several BTSs are commissioned, this will be done in a top-down manner: The BTSs directly connected to the RNC will be configured first. When these BTSs are running with their planned configuration, the BTSs immediately connected to them will be configured next, and so on.

The prerequisite for automated BTS commissioning is IP connectivity. This means that layer-1 (Physical Layer), layer-2 (IP Data Link Layer) and layer-3 (IP Layer) must all be operational. The main ideas to accomplish this are:

- Probing (i.e. trying out) of different layer-1 and layer-2 settings (E1/T1, IMA, ATM, AAL5 etc.)

- Assigning (via DHCP) a "lending address" from the subnet of the upstream BTS to the new not yet configured downstream BTS, which thus temporarily becomes a member of the upstream BTS subnet

In a fully automatic scenario, the new downstream BTS will get the address of a configuration server from the upstream BTS (this may have been contained in the DHCP response). Using some IP-based protocol as FTP, the downstream BTS will then contact this server and download and later activate its specific configuration file. In the server, the specific configuration file may be identified by the BTS serial number.

No prior physical, data link or IP layer configuration in the new BTS is needed, not even an IP address. In case the BTS gets screwed-up because of some wrong remote configuration action, the BTS can recover by applying the same process.