

## Information regarding

**LCOS Software Release 8.84 RU6**

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## 1. Preface

LCOS („LANCOM Operating System“) is the operating system for all LANCOM routers, wireless LAN access points and WLAN controllers. In the context of the hardware given by the products the at a time latest LCOS version is available for all LANCOM products and is available free of charge for download from LANCOM Systems.

This document describes the innovations within LCOS software release 8.84 RU6, as well as the improvements since release 8.62.

### Warning hint – Backing up the current configuration

Before upgrading your device to a new LCOS version it is essential to backup the configuration of your router. Due to extensive features it is not possible to downgrade to a previous firmware without using the backup configuration.

Please see the reference manual for instructions on how to backup the router configuration.

If you want to upgrade devices which are only accessible via router connections or WLAN bridges, please keep in mind to upgrade the remote device first and the local device afterwards.

### Hint - LCOS upgrade for devices LANCOM OAP/IAP-321-(3G) and LANCOM 1780EW-3G

Some of the current LANCOM WLAN routers and access points with LCOS 8.5 or earlier, which are to receive new firmware or extensive new configurations over the wireless LAN interface, may under certain circumstances suffer from WLAN connection loss. The result of this error is that the wireless link is interrupted and, in the worst case —such as with an outdoor point-to-point link— the device may lose contact completely. In this case, re-establishing the radio link would require a manual restart of the remote device by pressing the reset button. To prevent this we recommend to configure an -> alive test before uploading a new firmware.

### Upgrading central site components

We strongly recommend updating productive systems only after internal tests in client environment. Despite intense internal and external quality assurance procedures possibly not all risks can be eliminated by LANCOM Systems.

### Using converter firmwares

You will need enough free memory to use a firmware 6.0 and newer in your LANCOM 15x1, 1611+, 821+ and DSL/I-10+ and LCOS 8.0 in a LANCOM XAC or LANCOM 1823 VoIP. These changes apply for devices LANCOM 1722, 1723 and 1724 with LCOS 8.8 ff., too.

Due to the implementation of several new features within the current build of the firmware, it is no longer possible to store two main firmware versions side by side. To gain more free space for the current version, it is now necessary to upload a converter firmware into your device. The converter-firmware has a much smaller size, so that it is now possible to store the main release of the firmware besides the converter-firmware.

This setup is only necessary once for a single device and is done with the so-called converter-firmware (see readme.pdf of the affected devices).

After having flashed the converter-firmware the firmsave function of the LANCOM device is available only on a limited scale. The update to a newer firmware is furthermore possible. However, in case of an update failure the LANCOM will only work with a minimal-firmware which allows just local access to the device. Any extended functionality, in particular remote administration, is not possible when running the minimal-firmware.

#### Dynamic VPN registration

By reason of patent you have to register the functionality „Dynamic VPN“ with IP address transmission over ISDN. This operating mode is usually required when you configure a VPN tunnel with dynamic IP addresses on both sides without dynamic DNS services.

Any other Dynamic VPN operation mode (e.g. transmitting the IP address via ICMP, provoking a callback etc.) does not require registration.

The registration process is fully anonymous - no personal or company data will be transmitted.

The registration of the Dynamic VPN option requires administrator rights on the LANCOM device.

#### Using VoIP options

VoIP options for LANCOM 1821 Wireless ADSL are discontinued with LCOS 7.20. The final version containing the VoIP Call Manager is LCOS 6.32.

As from LCOS 7.5x support for VoIP options for the devices LANCOM 1511 Wireless DSL and 1521 Wireless ADSL is discontinued. The final version containing the VoIP Call Manager is LCOS 7.30.

For the „VoIP ready“ routers LANCOM 1711 VPN, 1721 VPN and 1811 Wireless DSL support for the subsequently installed VoIP option will be discontinued with LCOS version 7.56. If you want to continue using your VoIP option, please do only use LCOS versions up to and including 7.54.

For T-Systems Business LAN R800+ VoIP functionality is discontinued in LCOS 7.60

LCOS 7.70 is the final version supporting VoIP options for the remaining „VoIP ready“ devices.

#### Device specific support of the current LCOS version

As from LCOS 8.50 support for the following devices is discontinued:

- LANCOM 1811 Wireless
- LANCOM 1721 VPN

For the following devices the additional, LANconfig-like WEBconfig view is removed as from LCOS 8.60:

- LANCOM L-310
- LANCOM L-305
- LANCOM L-54 dual Wireless
- T-Systems Business LAN R800+

Please use instead either LANconfig or use the configuration view “LCOS Menu Tree” in WEBconfig

As from LCOS 8.80 support for the following devices is discontinued:

- LANCOM L-54 Wireless (Hardware release <E)
- LANCOM L-54 dual Wireless (Hardware release <G)
- LANCOM OAP-54-1 Wireless

As from LCOS 8.82 support for the following devices is discontinued:

- LANCOM XAP Wireless
- LANCOM L-305 / L-310 Wireless
- LANCOM L-54 dual Wireless

As from LCOS 8.84 support for the following devices is discontinued:

- Telekom R800+
- LANCOM 821+
- LANCOM 1611+
- LANCOM 1711
- LANCOM 1821n

## 2. Known Issues

Latest support notes and known issues regarding the current LCOS version can be found in the download area of our website <http://www.lancom-systems.eu/Common-Support-Hints.64.0.html>

### 3. New Features, Improvements and History

#### LCOS improvements 8.84.0231 RU5 ► 8.84.0244 RU6

##### Bugfixes / Improvements:

##### Network Connectivity:

- Improved support for double challenge authentication of the VoIP routers.
- ADSL sub interfaces are shown again within the MIB of the 1781A-3G.
- A problem with the VPN Load Balancer was solved.
- A problem with the bandwidth reservation was solved.
- In the CLI, it is no longer possible to create multiple DNS entries for the same name.

##### WLAN:

- Transmit power was optimized for wireless abg modules.

#### LCOS improvements 8.84.0193 RU3 ► 8.84.0231 RU5

##### Bugfixes / Improvements:

##### Network Connectivity:

- If there is a failure during a PPP negotiation, a backup connection is always established when the remote site is configured with a hold time of 9999.
- Improved propagation of additional routes via RIP
- A problem with an SNMP query is solved.
- The CLI command "who" now shows the correct time
- A problem with offline created configuration files with LANconfig was fixed, so that they can be installed via WEBconfig again.
- A problem with SMS is solved.
- The RTP timestamp is set correctly when RTP events are used within the callmanager.
- If the WWAN module disabled in the LCOS, the connection is also disconnected.

##### WLAN:

- The expire types are used correctly again when E-Mail2SMS is used.
- Block-Ack-Handling problem solved for different Wifi-Clients.
- Improvements of Wifi transmitting power at the 2.4 Ghz band.

## **LCOS improvements 8.84.0177 RU2 ► 8.84.0193 RU3**

### **New Features:**

#### **Network Connectivity:**

- LCOSCap and RPsap are automatically terminated if a firmware update is performed.
- Support of 1781VA-4G

### **Bugfixes / Improvements:**

#### **WLAN:**

- If RPsap is used, authentication and association frames are also recorded.
- Public Spot improvements

#### **Network Connectivity:**

- The DHCP Server ignores packets with invalid or wrong checksum.
- A bug was fixed which led to a non-functioning DNS forwarding.
- SIP-ALG improvements
- If the volume budget is used, it takes the month change into account.

**LCOS improvements 8.84.0142 RU1 ► 8.84.0177 RU2****New Features:****Network Connectivity:**

- Configurable RIP Output Delay
- RIP responses as an answer to a RIP request are sent to the sourceport of the RIP request (RFC 2453)
- It is now possible to change the SIM PIN
- Within the content filter the FQDN of a site which is connected by HTTPS is taken from the server certificate
- Support for VDSL vectoring for 'overlSDN' LANCOM devices

**Bugfixes / Improvements:****WLAN:**

- No access point restart when searching for printers from within the android app "Page Scope Mobile"
- No more errors when logging in to a Public Spot with the browser set to italian or spanish language
- No more loops when finishing Spectral Scan
- Bugfix in RADIUS protocol handling
- Corrected PMS trace display
- Reworked PMS Accounting Plus option
- Reworked Public Spot login
- New Public Spot login text for the LANCOM 1823
- Changed XML interface for Public Spot Re-login

**Network Connectivity:**

- The backup connection for the event „volume budget exceeded“ is established, even if no keepalive is set for this connection
- A manually set, alternative SMTP port is allowed again
- Hardware NAT is disabled for PPPoE remote stations
- Improvements in IKE memory management
- Reworked loadbalancer channel selection
- CLI: Reworked status display for the VPN menu
- Improved SIM card recognition
- Corrected MTU handling for Ipv6
- Padding bytes are allowed within MLPP
- Modified Link End record handling for the FIAS interface
- Improvements for the DH precalculation
- LANCAPI: better DDI support
- LANCAPI: Reworked LANCAPI-MSN handling
- LANCAPI: LANCAPI rejects the call if it knows that it won't be answered

## **LCOS improvements 8.84.0132 Rel ► 8.84.0142 RU1**

### **New Features:**

#### **Network Connectivity:**

- Implemented limitation to 2 SMS transmission attempts
- Syslog message is sent for an unsuccessful SMS delivery

### **Bugfixes / Improvements:**

- It is now possible to set the SSH Keepalive parameter on the CLI

## **LCOS improvements 8.84.0103 RC1 ► 8.84.0132 Rel**

### **New Features:**

#### **Network Connectivity:**

- Implementation of an X.25 bridge
- Configuration of further SNMP communities

### **Bugfixes / Improvements:**

#### **WLAN:**

- If the Accesspoint IP management is done statically by the WLC, the DHCP server is reactivated when deleting an IP address
- RADIUS accounting data is transmitted completely when using the XML interface

#### **VoIP:**

- The WAN address which is used by SIP-ALG is displayed correctly on the status page

#### **Network Connectivity:**

- If TACACS+ authentication is used, no readonly access is displayed for an SSH connection, since the TACACS+ server adopts the command rights management
- Read SMS messages can be marked as unread
- Accounting data is collected completely
- Access rights which are reported by the RADIUS server are evaluated correctly
- OCSP is available for a LANCOM 1681V



**LCOS improvements 8.82.0123 RU2 ► 8.84.00103 RC1****New Features:****WLAN:**

- RADIUS requests to the MAC address check provider are cached to avoid unessential queries
- 802.11u (Hotspot 2.0) can be configured via WLAN controller
- Improved WLAN throughput due to Adaptive Noise Immunity
- User accounts can be de/activated individually in the RADIUS table
- The LANCOM device recognizes a querier within the network and, if necessary, activates IMGP snooping automatically
- Multi-/Broadcasts can be sent within the WLAN with the lowest used data rate of all authenticated WLAN clients
- Accelerated WLAN roaming when using WPA2 Enterprise with OKC
- A PublicSpot error page can be displayed if the WAN connection is faulty
- A terms & conditions confirmation can be activated during a PublicSpot authentication via voucher
- Smart Ticket web pages can be individualized
- Further languages added to the PublicSpot pages
- A PublicSpot user can open a session information page later
- After a failed PublicSpot authentication the field „username“ is no longer cleared
- When using Smart Ticket the user can enter the mobile number in any format
- Smart Ticket can send an SMS directly via the LANCOM mobile radio module
- WLAN DHCP answers can be converted from broad- to unicasts
- User specific HTML code can be used in a PublicSpot template. This code will be shown user-dependent on the voucher
- For PublicSpot authentication the LAN MAC address, the LANCOM IP address and the client IP address can be handed over within the URL

**Network Connectivity:**

- Data volume display for WAN connections
- DSL sync information is logged to SYSLOG
- Detailed information for mobile radio connections is written to SYSLOG
- A /64 prefix can be forwarded to LAN unchanged with IPv6 WAN connections
- Support for the UMTS stick Web'n'Walk Fusion III
- The used LTE frequency bands can be set fix
- ARF networks with identical IP address ranges can be connected via Proxy ARP
- Sending and receiving SMS via LANCOM mobile radio module
- Implementation of a rollout wizard
- IPv6 addresses can be handled in the action table
- The LANCOM SMTP client supports encrypted connections (TLS/STARTTLS)
- A RADIUS authentication can be used for device login
- The LANCOM device automatically creates an SSH key after system reset
- Information for WAN connections which were established via IPoE/DHCPoE are written to SYSLOG
- Device information is no longer transferred within the HTTP header
- Enhanced the action table by the routing tag
- Sending SMS can be done with an appropriate HTTP call with mobile number and text as parameters

#### Bugfixes / Improvements:

##### WLAN:

- Access points in routed subnets connect to the WLC after a device restart
- A traceroute via a tagged connection is answered from the correct ARF network
- New Public Spot users can be created easily in a row using the setup wizard
- Authentication of a Public Spot user without browser (WISPr) does work in v1.0 and 2.0
- No further use of the previously retrieved website after logging out of the Public Spot

##### VoIP:

- If an external ISDN user connects a call to a further remote station, this connection works in both directions now
- SIP ALG handles shortforms within the SIP header correctly

##### Network Connectivity:

- No unneeded certificate errors are shown in the SYSLOG
- The VPN load limit for simultaneous tunnel establishments works for aggressive mode connections, too
- IPv6 prefix changes on a WAN interface are considered within the LAN accordingly
- With active DNS forwarders and disabled DNS server the LANCOM device answers DNS requests via masked default route with a „Port unreachable“.
- The CLI command „show vpn“ returns always the complete VPN rule listing
- NAT-T is included in the IPv6 firewall default configuration
- The CLI command „sshkeygen“ can be used in scripts using the parameter „-q“

### LCOS improvements 8.82.0100 RU1 ► 8.82.0123 RU2

#### Bugfixes / Improvements:

##### Network Connectivity:

- Improved initialization of the internal 3G/4G mobile modem after first start

## **LCOS improvements 8.82.0089 Rel ► 8.82.0100 RU1**

### **Bugfixes / Improvements:**

#### **WLAN:**

- No router restart when configuring Public Spot Email/SMS country codes
- If a not registered Public Spot Client accesses an HTTPS page, the generated SSL certificate is removed afterwards. Thus, a router restart due to memory shortage is avoided
- Browserless registration of a Public Spot user (WISPr) is now possible using the Windows 8 client, too
- If multi- or broadcasts are suppressed on a WLAN SSID, a client can still get an IP address via DHCP

#### **VoIP:**

- Improved support for non T.38 capable fax devices to a T.38 supported SIP line

#### **Network Connectivity:**

- During an ISDN-RAS dial-in the windows client is registered faster within the network
- Improved packet runtimes for data transmission with small packet sizes (e.g. VoIP) via IPsec-over-HTTPS
- Firewall rule conditions are evaluated for multicast packets, too
- If a RADIUS server is accessed via VPN tunnel, the NAS IP is communicated correctly
- No more device restart if there is a %s committed to the SYSLOG module (e.g. as variable within a URL)
- A LANCOMs configuration can be read via HTTPS using the current Chrome browser for Android devices

## **LCOS improvements 8.82.0067 RC2 ► 8.82.0089 Rel**

### **Bugfixes / Improvements:**

#### **WLAN:**

- Default text for the Public Spot administration portal SmartTicket is now language dependent
- The default value for the Public Spot login page protocol is set to HTTP
- An individual fallback template can be used within the Public Spot module
- The default Public Spot login page can be personalized by a description field
- Further optimization of the Public Spot templates
- For the smartphone-/tablet-display a second picture for the authentication mask can be uploaded

#### **VoIP:**

- After having finished a VoIP phone call, further incoming RTP packets in SIP-ALG are not discarded.
- SIP-ALG exchanges the external IP address with the IP address of the internal subscriber for REGISTER answer packets correctly

#### **Network Connectivity:**

- The ARF network type can be set correctly via CLI
- The IPv6 firewall value „Destination Cache Limit“ can be set via CLI
- Fixed a masking table overflow
- If a PPTP connection is closed by one site, e.g. by internet connection loss, further data can be transmitted on a new connection, even if the old connection is closed logically due to a failed polling

## **LCOS improvements 8.82.0051 RC1 ► 8.82.0067 RC2**

### **Bugfixes / Improvements:**

#### **WLAN:**

- When logging in to a LANCOM Public Spot network, the default browser is invoked automatically on IOS devices, showing the login screen
- New Public Spot display available for the LANCOM L-321, too
- Corrected website title for failed SmartTicket Login
- SmartTicket calling number forwarding included in the new templates

#### **Network Connectivity:**

- If the LANCOM device refuses an ISDN call for dynamic VPN, there is no error display anymore
- VPN connections with an extranet address can be re-established even if configured without keep-alive

## **LCOS improvements 8.80.0159 RU1 ► 8.82.0051 RC1**

### **New Features:**

#### **WLAN:**

- For LANCOM devices with Public Spot option the source VLAN and NAS port ID (interface) of the requesting WLAN client can be handed over within the URL
- Dynamic VLAN assignment for public spot users allows different profile properties (e.g. bandwidth)
- Broadcast and multicast transmission can be disabled per WLAN radio cell
- Support for 802.11u (Hotspot 2.0)
- Support for Public Spot login without using a browser (WISPr)
- The MAC address can be used to identify a Public Spot client to allow automatic re-login at a later time
- For the LANCOM 1781 devices the WLC option can be extended to 12 managed devices
- Public Spot users can be created automatically
- Improved display of the Public Spot configuration pages on tablets and smartphones

#### **Network Connectivity:**

- Adjustment of the syslog validity margin
- Support for the DHCPv6 server 'Reconfigure' option
- Extension of the internal syslog table
- DNS forwarding can be configured for each ARF network
- The firewall identifies and prevents source address flooding

### **Bugfixes / Improvements:**

#### **WLAN:**

- Multiple PMS (Property Management System) account data usage by the same user is subsumed in the accounting list.

#### **Network Connectivity:**

- Improved USB device recognition after reboot
- A LANCOM device does no longer answer LAN ARP requests unintentionally
- The USB port is reactivated after a USB overcurrent case

## **LCOS improvements 8.80.0157 RU1 ► 8.80.0159 RU1**

### **Bugfixes / Improvements:**

#### **Network Connectivity:**

- Improved initial recognition of the device's mobile access card on device boot

**LCOS improvements 8.80.0135 Rel ► 8.80.0157 RU1****Bugfixes / Improvements:****WLAN:**

- The configuration of a LANCOM 3850 without external WLAN card can be stored to the device without errors
- The automatic MAC address authentication within the Public Spot module can be used again
- URL forwarding works again after login when using Public Spot SmartTicket
- Radio-field optimization does no longer affect RADIUS configuration

**VoIP:**

- SIP-ALG can be used with LAN-LAN routing, too
- SIP-ALG can handle multiple accounts of a Telekom Call&Surf IP connection
- SIP-ALG allows for SIP update requests.

**Network Connectivity:**

- A RADIUS server can assign IPv4 addresses to the LANCOM again
- If a dynamic IPv6 prefix is used in conjunction with fixed address assignment, the assigned address is released when the current prefix is discontinued
- The masking address of the WAN IP table is no longer used for answering ARP requests
- Dynamic VPN over D channel can be used again
- An entry in the DNS forwarding table is operative without restart
- If a server sends a TCP ACK to an expired session, the LANCOM answers with an RST
- If no DNS server was assigned to an internet remote station, the DNS server under TCP/IP->Addresses is used

**LCOS improvements 8.80.0128 RC3 ► 8.80.0135 Rel****Bugfixes / Improvements:****WLAN:**

- Syslog reporting if a WLAN client is disassociated due to an invalid MAC address
- On a L-452 dual point-to-point connections are displayed by WLAN LED in addition to the WLAN station count
- The LANCOM 1781VA supports the Public Spot administration portal SmartTicket, too, and the XML interface between LANCOM Public Spot module and an external authentication gateway

**Network Connectivity:**

- Configured session- and user limits are considered again
- If a LANCOM 1781VA is used with an analog line, incoming calls do no longer lead to a loss of the ADSL sync of the internal modem
- Neighbour Solicitations on a PPP connection do not lead to proclamation of the default router in the LAN

## **LCOS improvements 8.80.0095 RC2 ► 8.80.0128 RC3**

### **New Features:**

#### **Network Connectivity:**

- LANCOM devices without integrated WLAN module can provide LEPS information for access points via the internal RADIUS server

### **Bugfixes / Improvements:**

#### **WLAN:**

- After activating a WLC option the access table is extended by the WLAN interface automatically

#### **VoIP:**

- If media information is missing in INVITE packets, there is no router restart if SIP-ALG is activated
- Optimized memory usage with activated SIP-ALG

#### **Network Connectivity:**

- Internal DNS requests are no longer blocked by the firewall if the DNS rule refers explicitly to the internet remote station
- The SSL port can be changed by WEBconfig again
- Invalid routes do no longer cause a router restart
- The LANCOM device can be configured via an interface which uses IPv6 auto configuration
- The default settings wizard allows device access from local and by VPN connected networks by default
- The internet wizard offers already existing remote stations in a selection list for activating IPv6
- A new IPv6 route is created in WEBconfig with correct default values
- The 4G LED of the LANCOM 1781-4G exclusively shows the state of the mobile connection
- If the WAN connection is terminated or the LANCOM device is manually restarted, VPN- and PPTP connections are terminated before
- Loadbalancer connections with a routing tag are considered in IDS recognition
- Improved VPN error display

## LCOS improvements 8.80.0078 RC1 ► 8.80.0095 RC2

### **New Features:**

#### **WLAN:**

- If all WLAN channels are blocked due to DFS detection this is reported to WLAN log table and syslog

#### **Network Connectivity:**

- Implementation of the new contentfilter category „Command & Control Server“
- Date and time can be set via GPS on devices with integrated mobile radio module
- IPv6 support for LANCOM 1722, LANCOM 1723 and LANCOM 1724

### **Bugfixes / Improvements:**

#### **WLAN:**

- Configurable country code in Public Spot / Smart Ticket

#### **VoIP:**

- No more faulty IP information in the contact field if SIP-ALG is used in conjunction with the loadbalancer

#### **Network Connectivity:**

- No error when trying to set an overlength password via WEBconfig
- The remote station is displayed in the accounting syslog
- Mobile connections can be established with the LANCOM 1781-4G again



**LCOS improvements 8.62.0050 RU2 ► 8.80.0078 RC1****New Features:****WLAN:**

- Implementation of WLAN Band Steering
- Implementation of Spectral Scan
- Support for STBC (Space/Time Block Coding) and LDPC (Low Density Parity Check)
- Support for DFS 4
- Support for Public Spot Administration portal SmartTicket
- Release for DNS domains in the Public Spot table „Free Networks“
- Implementation of an XML interface between the LANCOM Public Spot module and an external authentication gateway
- Public Spot users who become authenticated via the internal LANCOM RADIUS server do no longer have to pay attention for upper-/lowercase when entering their usernames
- The link state of a WLAN Point-to-Point connection is shown
- WLAN performance improvements between 11n- and abg clients (Airtime Fairness)
- abg clients are rejected in Greenfield mode
- Wildcards may be used in the Public Spot table „Free Networks“
- A possible multi-login can be configured using the WEBconfig's PublicSpot Wizard
- Using a WLC different RADIUS servers can be assigned to the access points for each SSID
- Public Spot user management can be allowed via separate access rights
- If a LANCOM dual radio client roams, one WLAN module is connected to the “old” access point until the second WLAN module is connected successfully to the “new” access point
- UUID transmission within the WLAN beacons, so that WLAN planning software is able to recognize dual access points

**Network Connectivity:**

- Migration of IPv4 and IPv6 (Dual-Stack)
- IPv6 Gold certification (Core protocols and DHCPv6 servers)
- Implementation of the IPv6 firewall
- Support for stronger key lengths for encrypted connections
- Syslog-, eventlog- and bootlog output can now be saved to flash bootpersistent
- Configuration files and certificates can be uploaded to the LANCOM via SSH
- Configuration changes are written to the syslog protocol
- By default, syslog output is changed to show new entries on top of the table
- Pre-calculation of Diffie-Hellman keys for faster connection establishment
- SNMP read access via community „Public“ is possible on VPN connections, too.
- Support for IPsec Replay Detection
- By default, accounting data is no longer written to the syslog protocol
- Configurable SSH protocols and key lengths
- The DSLoL interface is used in exclusive mode by default
- Network traffic can be recorded via WEBconfig (Wireshark compatibility)
- Configurable Brute Force protection for profile requests for the myVPN application
- Profile request for the myVPN application can be suppressed on the WAN
- Support for the Link Layer Discovery Protocol (LLDP)
- Multiple VPN errors can be reset using only one command
- Invalid column names or SNMP-IDs are ignored by a script's tab command
- By default, NTP server requests are done with reduplicate timeouts, until time is successfully synced. Syslog messages are generated for success or fail

### Bugfixes / Improvements:

#### WLAN:

- If a PublicSpot voucher is printed via „Manage Public Spot users “ at a later time, the SSID is printed, too
- Activating an alternative boot configuration includes the WLAN parameters, too
- If an access point gets an IP address from a WLAN controller over a routed connection, the WLC remains accessible for the AP
- No more WLAN performance problems due to aggregation errors on a LANCOM L-45x

#### VoIP:

- Incoming calls on a PBX connection can be answered via SIP-ALG
- Via SIP-ALG incoming calls can be answered even if there are multiple lines to the same registrar

#### Network Connectivity:

- If the clock is set with disabled DST, the time is set correctly
- Improvements in fax receiving via LANCAPI
- DNS forwardings are sent with the correct source address with multiple tagged ARF networks
- Connection via Il2m works even if data packets arrive duplicate (e.g. redundant network paths)
- Uncategorized sites are no longer treated as whitelist addresses by the Content Filter
- The email notification of the content filter sends daily messages only if an appropriate event has occurred (e.g. license expiration)

#### 4. Comments

If you want to upgrade the firmware of your device to a new version, please install the latest LCMS version first. **Before running the firmware-upload you should save the router configuration to a file.** After that you can use LANconfig to load the latest LCOS-version into the device.

In principle, we suggest upgrading the firmware of your device only if you are in need of the latest features.

Please note that different firmware files might be available for your device. Further information can be found in the file README.PDF in the download area of our homepage.