



RESEARCH AND DEVELOPMENT TELECOMMUNICATIONS INSTITUTE

# LCT-DVM1 DTMB Modulator's Control System Design

**Author:** MSc Ing. Yosmany Hernández Sánchez

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## Topics

- Introduction
- LCT-DVM1 Structure
- Control System software architecture
- Local User Interface
- Web Server Interface
- Bootloader & Updater
- Future enhancements

# Introduction



✓ Active role of **LACETEL** into the development of in-house solutions targeted to the DTV broadcasting chain:

- **LCT-DVM1 DTMB Modulator**





# Control System Requirements

- ✓ Local user interface
- ✓ Availability of communication interfaces to control the processing channel components (I<sup>2</sup>C, SPI & UART)
- ✓ Remote user interface (with same or better features than local interface)
- ✓ Upgrade capability in the final deployment scenario

# LCT-DVM1 Software Architecture

**Control System  
Application**

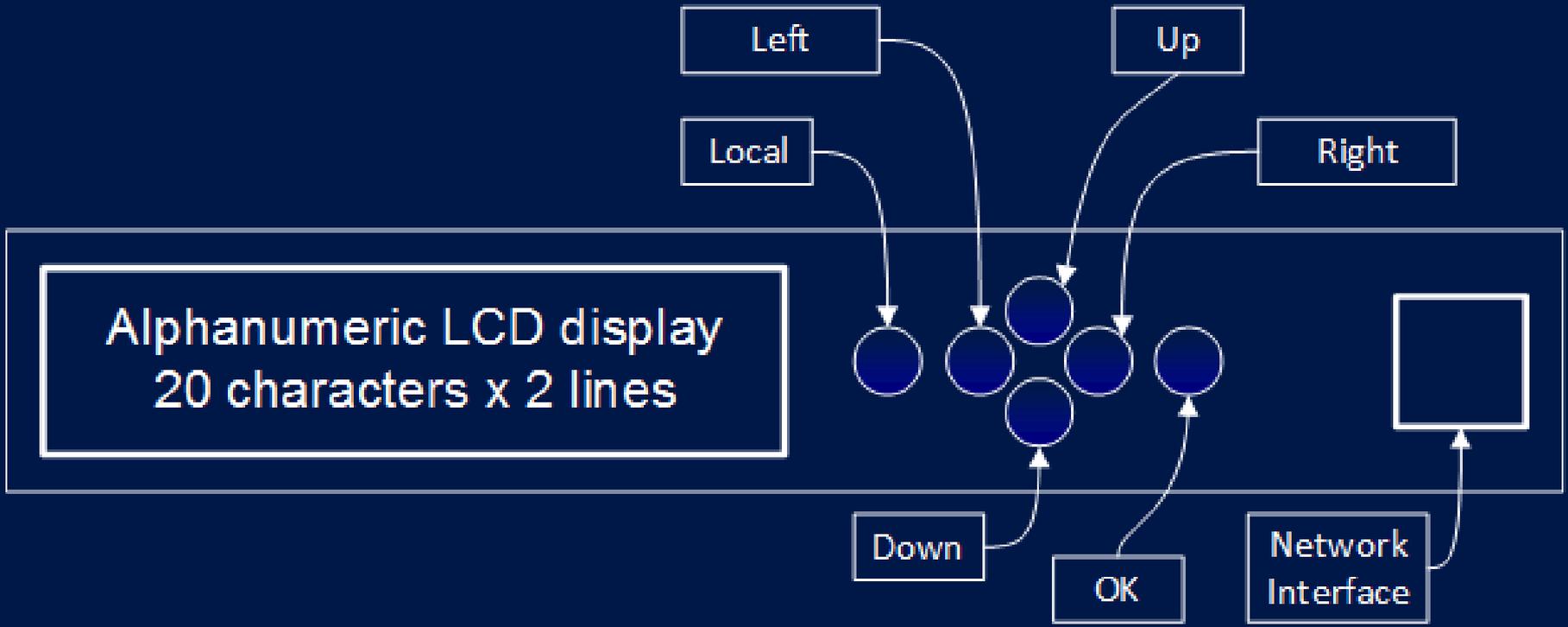
**FreeRTOS Real Time  
Operating System**

**Hardware Board Support  
Package (Drivers)**

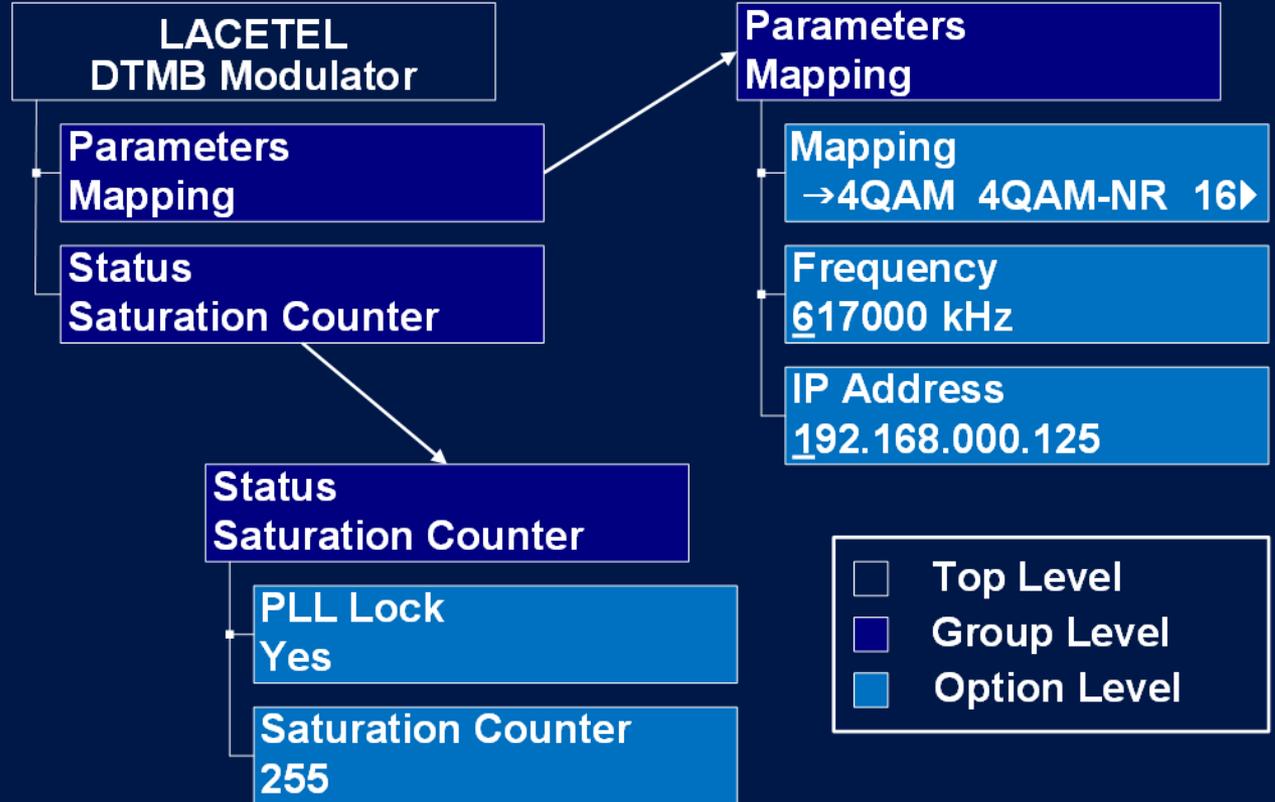
# LCT-DVM1 Control System Application

- ✓ Front Panel with menu system (display + keypad)
- ✓ Embedded HTTP Web server
- ✓ Internal serial port upgrade interface

# LCT-DVM1 Front Panel



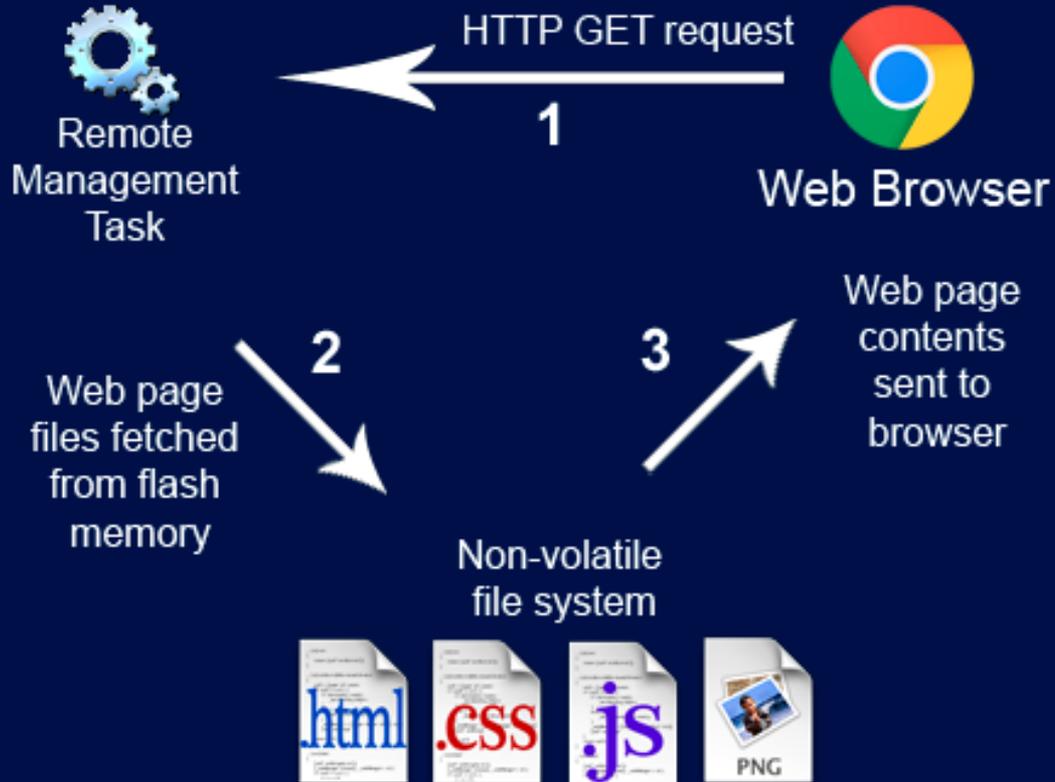
# LCT-DVM1 Front Panel Menu system



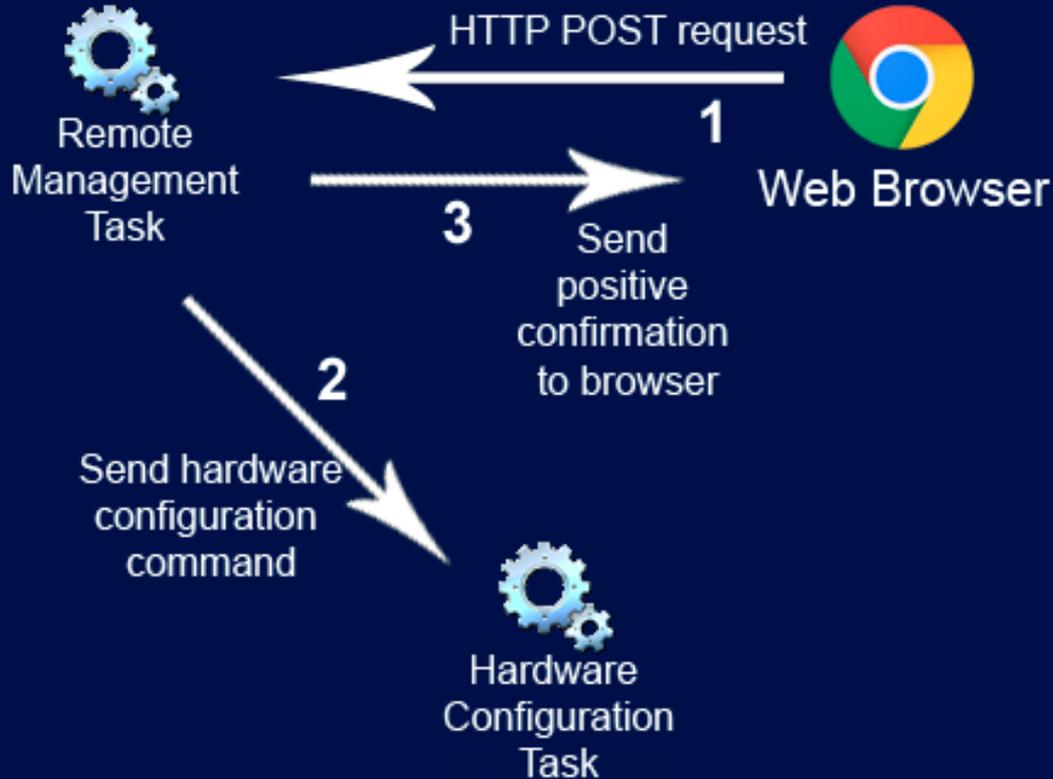
# LCT-DVM1 HTTP Server

- ✓ Support for GET requests (web page loading)
- ✓ Support for POST requests (parameters modification)

# LCT-DVM1 HTTP Server: GET request



# LCT-DVM1 HTTP Server: POST request





# LCT-DVM1 HTTP Server: Interfaces [RF Output]



## Transmission Parameters

Frequency:  MHz

Power:  dBm

BW:  MHz

Spectrum Polarity:

Network Mode:

### Modulator State

RF Output	Modulation Scheme	Alarms
No	No	No



# LCT-DVM1 HTTP Server: Interfaces [Modulation]



RF Output

Modulation scheme

Alarms

[www.lacetel.cu](http://www.lacetel.cu)

## Modulation Parameters

Carrier Number: 3780(MC) ▾

Symbol Mapping: 64QAM ▾

FEC: 0.6 ▾

Interleaver: 720; 52 ▾

Guard Interval: PN-420 ▾

Default Setup

Apply Settings

## Modulator State

RF Output	Modulation Scheme	Alarms
No	No	No



# LCT-DVM1 HTTP Server: Interfaces [Status]



RF Output

Modulation scheme

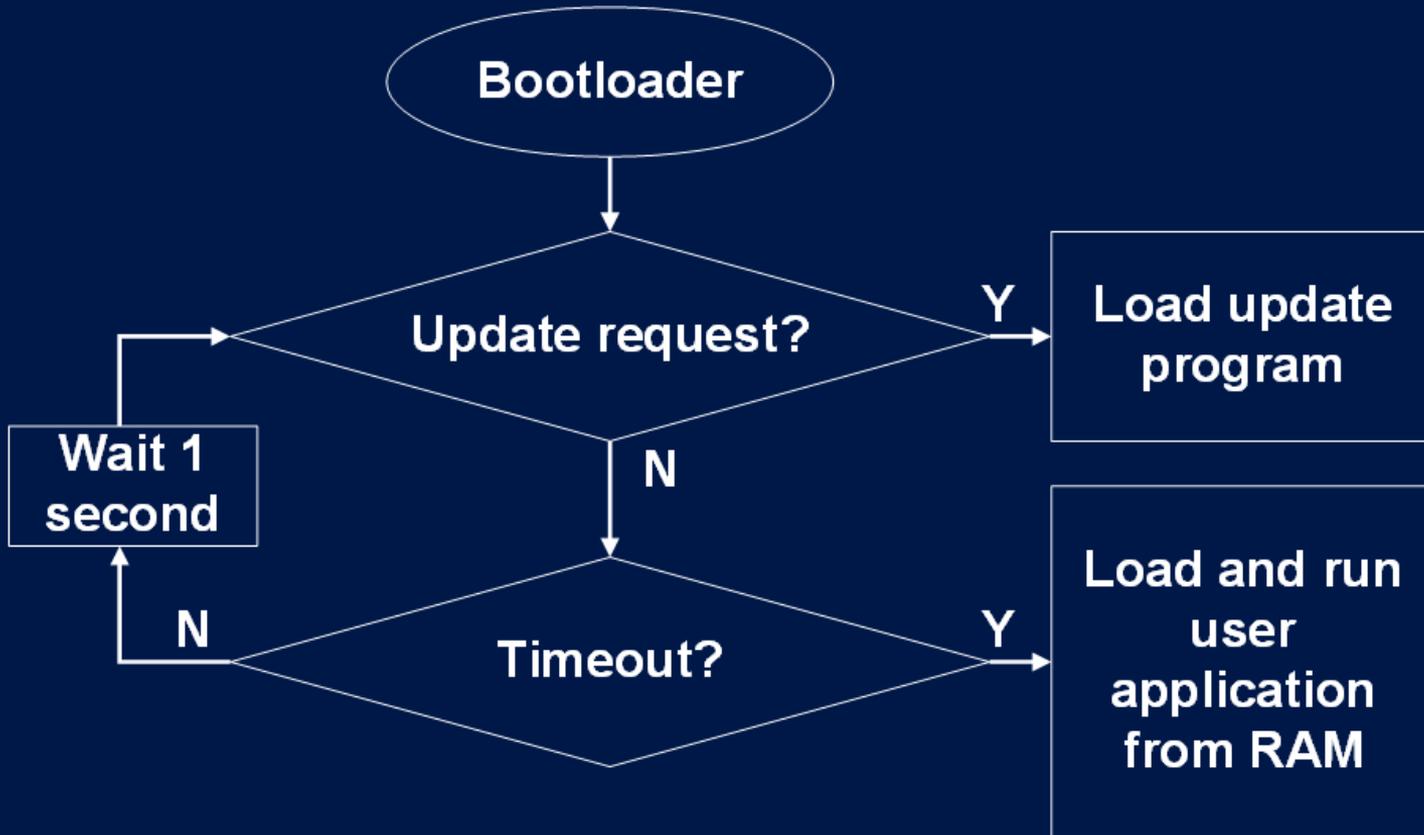
Alarms

[www.lacetel.cu](http://www.lacetel.cu)

## LCT-DVM1 Status

Parameter	Status
ASI Input connection	No
RF Output connection	No
I/Q Parity errors	No
RF Output	No
Modulation Scheme	No

# LCT-DVM1 Bootloader & Updater



## LCT-DVM1 Future enhancements

- ✓ Implement SNMP network protocol as additional remote control method
- ✓ Implement upgrade functions through Ethernet interface
- ✓ Implement machine-to-machine interfaces to allow operation in master-slave configurations with other modulators



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