ac6

This course explains the implementation of the LwIP stack on STM32 MCUs

Objective

- Describing lwIP stack and how to implement it (particularly on STM32F2).
- This course particularly describes the parameterizing of the stack.
- A lot of labs have been developed to explain the various protocol operation.

This document is necessary to tailor the course to specific customer needs and to define the exact schedule.

Prerequesites and related courses

- This course requires the knowledge of STM32Fx, see our courses <u>STR4 - STM32 F0-Series implementation</u>course and <u>STR5 - STM32 F1-Series implementation</u> course.
- The following courses could be of interest:
    - Ethernet and switching, reference <u>N1 - Ethernet and switching</u>course
    - IEEE1588, reference <u>N2 - IEEE1588 - Precise Time Protocol</u>course

Course Environment

- Theoretical course
    - PDF course material (in English) supplemented by a printed version for face-to-face courses.
    - Online courses are dispensed using the Teams video-conferencing system.
    - The trainer answers trainees' questions during the training and provide technical and pedagogical assistance.
- At the start of each session the trainer will interact with the trainees to ensure the course fits their expectations and correct if needed

Target Audience

- Any embedded systems engineer or technician with the above prerequisites.

Evaluation modalities

- The prerequisites indicated above are assessed before the training by the technical supervision of the traineein his company, or by the trainee himself in the exceptional case of an individual trainee.
- Trainee progress is assessed by quizzes offered at the end of various sections to verify that the trainees have assimilated the points presented
- At the end of the training, each trainee receives a certificate attesting that they have successfully completed the course.
    - In the event of a problem, discovered during the course, due to a lack of prerequisites by the trainee a different or additional training is offered to them, generally to reinforce their prerequisites,in agreement with their company manager if applicable.

Plan

Day 1

Ethernet Protocol overview

- Ethernet Addressing
- Frame format
- Frame filtering
- VLAN tag usage
- Using WireShark to capture Ethernet traffic

LwIP Stack Description

- Overview
- Buffer and memory management
- Network interfaces
- IP processing
- UDP processing
- TCP processing
- Interfacing the stack
- Application Program Interface (API)
- BSD socket library

Day 2

Low level Driver for STM32

- Global Ethernet MAC/DMA functions
- DMA descriptor handling
- PHY control functions
- Hardware Cheksum

Developping applications with lwIP stack

- PHY interface configuration
- MAC and IP address settings
- Developing in standalone mode (RAW API)
- Developing with an RTOS using Netconn or Socket API
- lwIP memory configuration options

Practical labs

- Standalone demos
- HTTP server
- TCP echo client / TCP echo server
- UDP echo client / UDP echo server
- TFTP server
- FreeRTOS demo
- HTTP server netconn
- HTTP server socket
- UDP TCP echo server netconn

Renseignements pratiques

Inquiry : **2 days**