Protocols for Data Transport for IoT

Academic Year: (2020 / 2021) **Review date: 22-01-2021**

Department assigned to the subject: Telematic Engineering Department

Coordinating teacher: GARCIA RUBIO, CARLOS

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

IoT Network Architectures

OBJECTIVES

BASIC COMPETENCES

CB6 Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context

CB7 That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study

CB8 That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.

CB9 That students know how to communicate their conclusions and the knowledge and ultimate reasons that sustain them to specialized and non-specialized audiences in a clear and unambiguous way.

GENERAL COMPETENCES

CG1 Capacity to identify, define and formulate the problems to solve related to IOT applications. This capacity includes simultaneous assessment of all the factors of the game, not only technical, but also environmental and civil liability.

CG5 Capacity to public communications of the concepts, developments and results, related to IOT activities, adapted to the audience profile.

CG6 Capacity to apply the knowledge acquired and solve problems in new or unfamiliar environments within broader and multidisciplinary contexts, with the capacity to integrate knowledge.

SPECIFIC COMPETENCES

CE3 Capacity to identify security risks in communications in IoT environments and identify appropriate communication protocols to mitigate the identified risks.

CE4 Capacity to design and implement communications networks for IoT environments.

CE5 Capacity to design, develop, manage and evaluate security assurance mechanisms in the treatment and access to information in computationally limited devices and in IoT networks.

CE11 Capacity to design and control the latest generation wireless networks in IoT applications.

CE12 Capacity to apply device communication, both among them and globally, in the IoT environment.

LEARNING RESULTS

The learning outcomes that students should have are:

- Know the communication protocols for IoT networks.
- Know the security mechanisms for IoT communications.
- Ability to design a communication solution for IoT by selecting and adapting the communication protocols that are most suitable for the use case.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction.
2. Application layer protocols: HTTP, CoAP, MQTT / MQTT-SN, others.
3. Discovery: DNS-SD / mDNS, CoAP Resource Discovery.
4. Security in IoT networks: DTLS and others.
5. Labs.

LEARNING ACTIVITIES AND METHODOLOGY

AF1 Theoretical class.
AF4 Laboratory practices.
AF6 Group work.
AF7 Individual work of the student.
AF8 Partial and final exams.

Code Activity	No. Total hours	No. Classroom hours	% Classroom
AF1	10,5	10,5	100
AF4	10,5	10,5	100
AF6	20	0	0
AF7	32	0	0
AF8	2	2	100
TOTAL	75	23	31%

EDUCATIONAL TRAINING METHODOLOGIES:
MD1 Exhibitions in the teacher's class with support of computer and audiovisual media, in which the main concepts of the subject are developed and the bibliography is provided to complement the students' learning.
MD2 Critical reading of texts recommended by the teacher of the subject: articles, reports, manuals and / or academic articles, either for further discussion in class, or to expand and consolidate the knowledge of the subject.
MD3 Resolution of practical cases, problems, etc. raised by the teacher individually or in groups
MD4 Exhibition and discussion in class, under the teacher's moderation of topics related to the content of the subject, as well as case studies
MD5 Preparation of reports individually or in groups.

ASSESSMENT SYSTEM

SE2 Individual or group work carried out during the course
SE3 Final exam

The assessment of the subject will be according to the following:
- Individual or group work carried out during the course (SE2): 20% of the final grade.
- Final exam (SE3): 80% of the final grade.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- Al-Fuqaha, A.; Guizani, M.; Mohammadi, M.; Aledhari, M.; Ayyash, M Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications, Communications Surveys & Tutorials, IEEE , vol.17, no.4, pp.2347-2376,, Fourth quarter 2015
- Douglas Comer The ZigBee IP Protocol Stack, The Internet Protocol Journal, Volume 17, No. 2,, December 2014
- Ilya Grigorik HTTP/2: A New Excerpt from High Performance Browser Networking, O'Reilly, 2015
- Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri Internet of Things: Architectures, Protocols and Standards, Wiley, 2018
- Stallings, W. Internet of Things: Network and Security Architecture, Internet Protocol Journal, vol.18, no. 4, pp. 2-24,, Dec 2015
- V. Karagiannis, P. Chatzimisios, F. Vázquez-Gallego, J. Alonso-Zarate A Survey on Application Layer Protocols for the Internet of Things, Transaction on IoT and Cloud Computing, Vol. 1, No. 1,, January 2015
- Villaverde, B.C.; De Paz Alberola, R.; Jara, A.J.; Fedor, S.; Das, S.K.; Pesch, D. Service Discovery Protocols for Constrained Machine-to-Machine Communications, Communications Surveys & Tutorials, IEEE ol.16, no.1, pp.41-60, First Quarter 2014

ADDITIONAL BIBLIOGRAPHY

- Selander, G.; Mattson, J.; Palombini, F.; Seitz, L. Object Security for Constrained RESTful Environments (OSCORE), Internet-Draft; IETF, Fremont, CA, USA, 2018.