



ITU Centres of Excellence Network for Arab Region

Sudatel Telecommunications Academy (SUDACAD)

Face-to-Face Training on  
“Software Defined Networking (SDN) and Open Flow Practical Implementation”  
Khartoum-Sudan, 24-26 June 2019

COURSE OUTLINE

COURSE DESCRIPTION

Title	<b>Software Defined Networking (SDN) and Open Flow Protocol practical implementation</b>
Objectives	<ul style="list-style-type: none"><li>• Be able to explain the core concepts of SDN and OpenFlow</li><li>• Implementing and configure SDN environment</li><li>• Working with various open source and commercial controller</li><li>• Building different SDN topologies by using SDN Simulation(Mininet)</li><li>• Understanding and Implementing different network application in various SDN Controller</li></ul> Opportunity to take the ONF SDN Associates Certification (OCSA) at the end of your course program
Dates	<b>24-26 June 2019</b>
Duration	<b>3 Days</b>
Registration deadline	<b>15 June 2019</b>
Training fees	<b>150 USD</b>
Course code	<b>19WS24259ARB-A</b>

LEARNING OUTCOMES

This training aims at providing all participants with extensive insights on “SDN”.

Upon successful completion of this course, students should:

- Be able to explain and discuss the basic concepts and architecture of SDN.
- Be able to compare and contrast conventional networking approaches and SDN.
- Be able to explain and understand how OpenFlow is the open-standard transport mechanism used to make SDN possible.
- Be able to Understand the basics of building an SDN application, inclusion issues relate to devices, Controller and application types.

## TARGET POPULATION

Strategic planners, network architects, network managers, systems engineers, network administrator, service planners and carrier operation staff who are responsible for planning, implementing and deploying networks which may require SDN and OpenFlow techniques in the future.

## TUTORS/INSTRUCTORS

NAME OF TUTOR(S)/INSTRUCTOR(S)	CONTACT DETAILS
AHMED ABDELAZIZ ABDELATIF OSMAN	Email : <a href="mailto:ahmedmazar1977@gmail.com">ahmedmazar1977@gmail.com</a>

## EVALUATION

The assessment of the participants shall be based on the attendance and a final test. The latter will be based on QCM and Short Questions on the different parts of the course.

## TRAINING SCHEDULE AND CONTENTS / AGENDA

Date for 1 <sup>st</sup> day	Time; Start time	Topics/Activities
24/6/2019	09:00-9:30	Registration Round table Ground rules
	09:30-11:00	Introduction of the SDN <ul style="list-style-type: none"> <li>• SDN in the Network Market</li> <li>• SDN Solutions from big companies</li> <li>• the challenges of the traditional Network</li> <li>• What is the SDN</li> <li>• What is OpenFlow</li> <li>• Evolution of the SDN</li> <li>• The advantages of using SDN</li> <li>• Compare between Traditional Network and SDN Network</li> </ul>
	11:15-13:00	SDN architecture <ul style="list-style-type: none"> <li>• OpenFlow Switch (Data layer)</li> <li>• OpenFlow Controller (Control Layer)</li> <li>• OpenFlow Application (Application Layer)</li> </ul>
	14:00-15:30	Setup the SDN environment with Mininet simulation <ul style="list-style-type: none"> <li>• Install and configure OVB</li> <li>• Download and Install Mininet</li> <li>• Working with Mininet commands</li> <li>• Working with the Wireshark</li> </ul>
	15:45-17:00	Using OpenFlow software switch <ul style="list-style-type: none"> <li>• Downloading and installing OpenVswitch (OVS)</li> <li>• Configuration of the OVS</li> </ul>

Date for 2 <sup>nd</sup> day	Time; Start time	Topics/Activities
25/6/2019	09:00-9:30	Day 1 review and recap. Planned Q and A periods.
	09:30-11:00	Reactive and Proactive flows in SDN <ul style="list-style-type: none"> <li>• What is Reactive and Proactive flow</li> <li>• Proactive and Traditional protocols</li> <li>• Wildcard match</li> <li>• Coarse vs. Fine Flows</li> <li>• Elephant Vs Macro Flow</li> <li>• Reactive vs. Proactive</li> <li>• OF Specification 1.5 Glossary</li> <li>• Using Floodlight Controller in Proactive and Proactive Flow</li> <li>• Add flow from file</li> </ul>
	11:15-13:00	Using ovs-ofctl for Proactive flow <ul style="list-style-type: none"> <li>• Hands-on for using the ovs-ofctl tools</li> </ul>
	14:00-15:30	Working with ODL Controller <ul style="list-style-type: none"> <li>• What is ODL</li> <li>• ODL Architecture</li> <li>• SAL Service Abstraction Layer</li> <li>• Protocol plugins</li> <li>• Downloading, installing and running ODL</li> <li>• Install and configure ODL features</li> <li>• Connect ODL to Mininet</li> <li>• Working with ODL GUI</li> </ul>
	15:45-17:00	Working with ONOS Controller <ul style="list-style-type: none"> <li>• What is ONOS</li> <li>• ONOS Architecture</li> <li>• Downloading and installing ONOS</li> <li>• Activate ONOS features</li> <li>• Connect ONOS to Mininet</li> <li>• Working with ONOS GUI</li> </ul>

Date for 3 <sup>rd</sup> day	Time; Start time	Topics/Activities
26/6/2019	09:00-9:30	Day 2 review and recap. Planned Q and A periods.
	09:30-11:00	integrated SDN with Open Stack cloud computing
	11:15-13:00	Using the Restful APIs to create SDN application <ul style="list-style-type: none"> <li>• Understanding Restful APIs</li> <li>• Implementing Restful APIs with ONOS and Floodlight SDN controller</li> </ul>
	14:00-15:30	SDN Open Source Projects <ul style="list-style-type: none"> <li>• SDN open sources controllers</li> <li>• Open source Open Flow switches</li> </ul>
	15:45-17:00	Completed examples for creating and managing SDN network in: <ul style="list-style-type: none"> <li>• Datacenter network</li> </ul>

		<ul style="list-style-type: none"> <li>• WAN network</li> <li>• Cloud network</li> </ul>
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## METHODOLOGY

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The face-to-face program will include Instructor-led presentations, Case Studies, Group Exercises, and Quizzes.

## COURSE COORDINATION

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<p><b><u>Training Coordinator:</u></b></p> <p><b>Eng. Atif Hamad Abdalla Hamad</b>  Senior Manager  Training Development &amp; Planning  Tel: +249 183 46 77 17  Mobile: +249 120 12 01 87  Fax: +249 183 48 78 99  Email: <a href="mailto:atifha@sudatel.sd">atifha@sudatel.sd</a></p>	<p><b><u>ITU Coordinator:</u></b></p> <p><b>Eng. Mustafa Al Mahdi</b>  Programme Administrator  Arab Regional Office-ITU  Tel: +202 3537 1777  Mobile: +20114 117 75 73  Fax: +202 3537 1888  Email: <a href="mailto:mustafa-ahmed.al-mahdi@itu.int">mustafa-ahmed.al-mahdi@itu.int</a></p>
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## REGISTRATION AND PAYMENT

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### ITU Academy portal account

Registration and payment should be made online at the ITU Academy portal.

To be able to register for the course you MUST first create an account in the ITU Academy portal at the following address:

<https://academy.itu.int/index.php/user/register>.

## Training registration

When you have an existing account or created a new account, you can register for the course online at the following link: <https://academy.itu.int/index.php/training-courses/full-catalogue/software-defined-networking-sdn-and-openflow-protocol-practical-implementation>

You can also register by finding your desired course in our training catalogue <https://academy.itu.int/index.php/training-courses/full-catalogue>.

## Payment

### 1. On-line payment

A training fee of USD 150 per participant is applied for this training. Payments should be made via the online system using the link mentioned above for training registration at <https://academy.itu.int/index.php/training-courses/full-catalogue/software-defined-networking-sdn-and-openflow-protocol-practical-implementation>

### 2. Payment by bank transfer

Where it is not possible to make payment via the online system, select the option for offline payment to generate an invoice using the same link as above. Download the invoice to make a bank transfer to the ITU bank account shown below. Then send the proof of payment/copy of bank transfer slip and the invoice copy to Hcbmail@itu.int and copy the course coordinator. All bank transaction fees must be borne by the payer.

Failure to submit the above documents may result in the applicant not being registered for the training.

### 3. Group payment

Should you wish to pay for more than one participant using bank transfer and need one invoice for all of them, create an account as **Institutional Contact**. **Institutional Contacts** are users that represent an organization. Any student can request to be an institutional contact or to belong to any existing organization.

To do this, head to your profile page by clicking on the “**My account**” button in the user menu. At the bottom of this page you should see two buttons:

- a. If you want to **become an institutional contact**, click on the “**Apply to be an Institutional Contact**” button. This will redirect you to a small form that will ask for the organization name. After you fill the name of the organization you want to represent, click on “**continue**” and a request will be created. An ITU Academy manager will manually review this request and accept or deny it accordingly.
- b. If you want to **belong to an existing organization**, click on the “**Request to belong to an Institutional Contact**” button. This will redirect you to a small form that will ask you to select the organization you want to join from an organization list. After you select the correct organization, click on “**continue**”, a request will then be created. The Institutional Contact that represents that organization will manually accept or deny your request to join the organization.

#### ITU BANK ACCOUNT DETAILS:

Name and Address of Bank:	UBS Switzerland AG Case postale 2600 CH 1211 Geneva 2 Switzerland
Beneficiary:	Union Internationale des Télécommunications
Account number:	240-C8108252.2 (USD)
Swift:	UBSWCHZH80A

IBAN	CH54 0024 0240 C810 8252 2
Amount:	USD 150
Payment Reference:	CoE-ARB [24259]-[WBS No. P.40592.1.06]

#### **4. Other method of payment**

If due to national regulations, there are restrictions that do not allow for payment to be made using options 1 & 2 above, please contact the ITU Coordinator for further assistance.