

# Internet Society

## Online Training Opportunities for African NOGs and NRENs

*By Kevin Chege (ISOC)*

**KENET Annual University ICT directors Forum – April  
9 – 10**

Intercontinental Hotel Nairobi



# What is the Internet Society?

The Internet Society (ISOC) is a cause-based organization that works with governments, industries, and others to ensure the technologies and policies that helped develop and evolve the Internet will continue into the future.

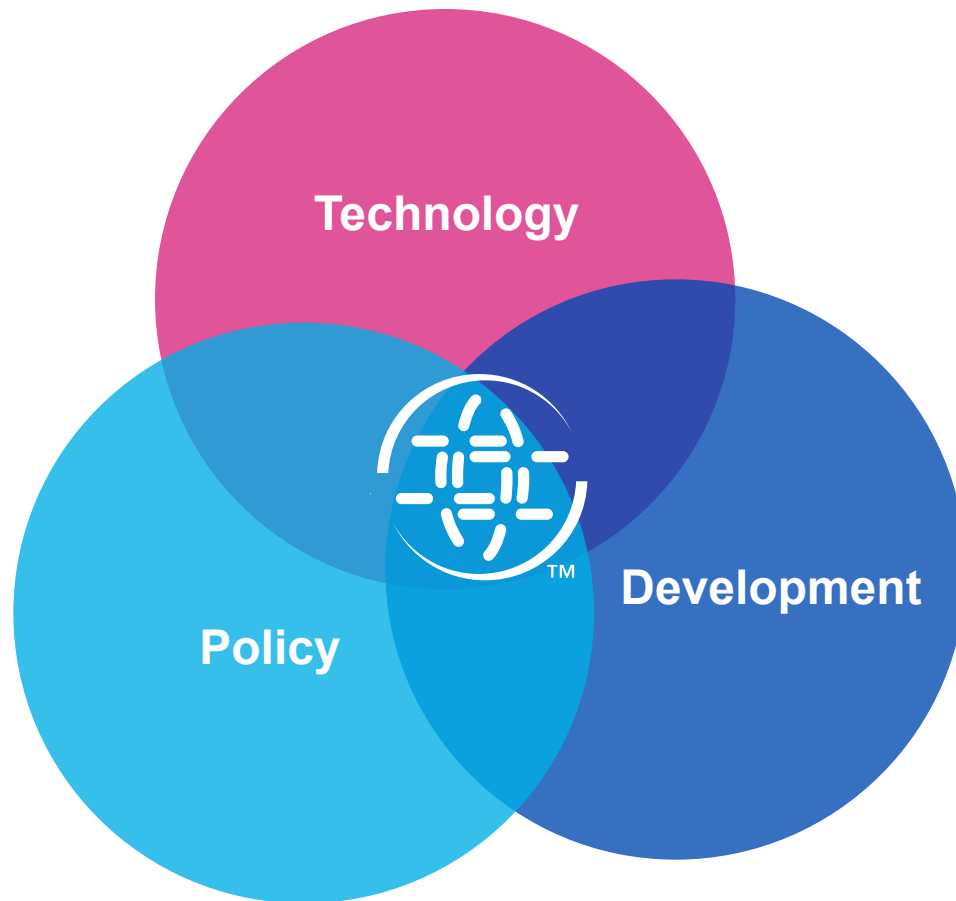
Our programs cultivate an Internet that is open to everyone, everywhere and aim to ensure that it will continue to be a tool for creativity, innovation, and economic growth.

**MISSION:** To promote the open development, evolution, and use of the Internet for the benefit of all people throughout the world.

**VISION:** The Internet is for everyone



# How We Work To Protect Our Internet



Operating at the intersection of **policy**, **technology**, and **development** allows the Internet Society to be a thought leader on issues key to the Internet's continued growth and evolution.

## **Policy work on the Internet**

- **Our work is based upon our fundamental belief that the Internet is for everyone.**
- **In pursuing our objectives, we operate collaboratively and inclusively, working with governments, national and international organizations, civil society, the private sector, and other parties to reach decisions about the Internet that conform to our core values.**

# Global Presence



**100+**  
Chapters  
Worldwide

**65,000+**  
Members and  
Supporters

**145+**  
Organization  
Members

**6**  
Regional  
Bureaus

**18**  
Countries with  
ISOC Offices

# ISOC's Capacity Building activities in Africa

## Why work on Capacity Building in Africa?

- Africa urgently needs a much greater pool of skilled experts and technical engineers to ensure the Internet becomes the critical part of the infrastructure in African countries.
- Significant investment is underway in Africa's submarine and terrestrial fiber from both Public and Private sectors. As a result, the demand for a pool of skilled experts and trained engineers in Internet technologies and services to manage, operate and maintain these investments will continue to grow.
- A vendor neutral training is best placed to address these skill gaps

# **ISOC's Track Zero Localization Program**

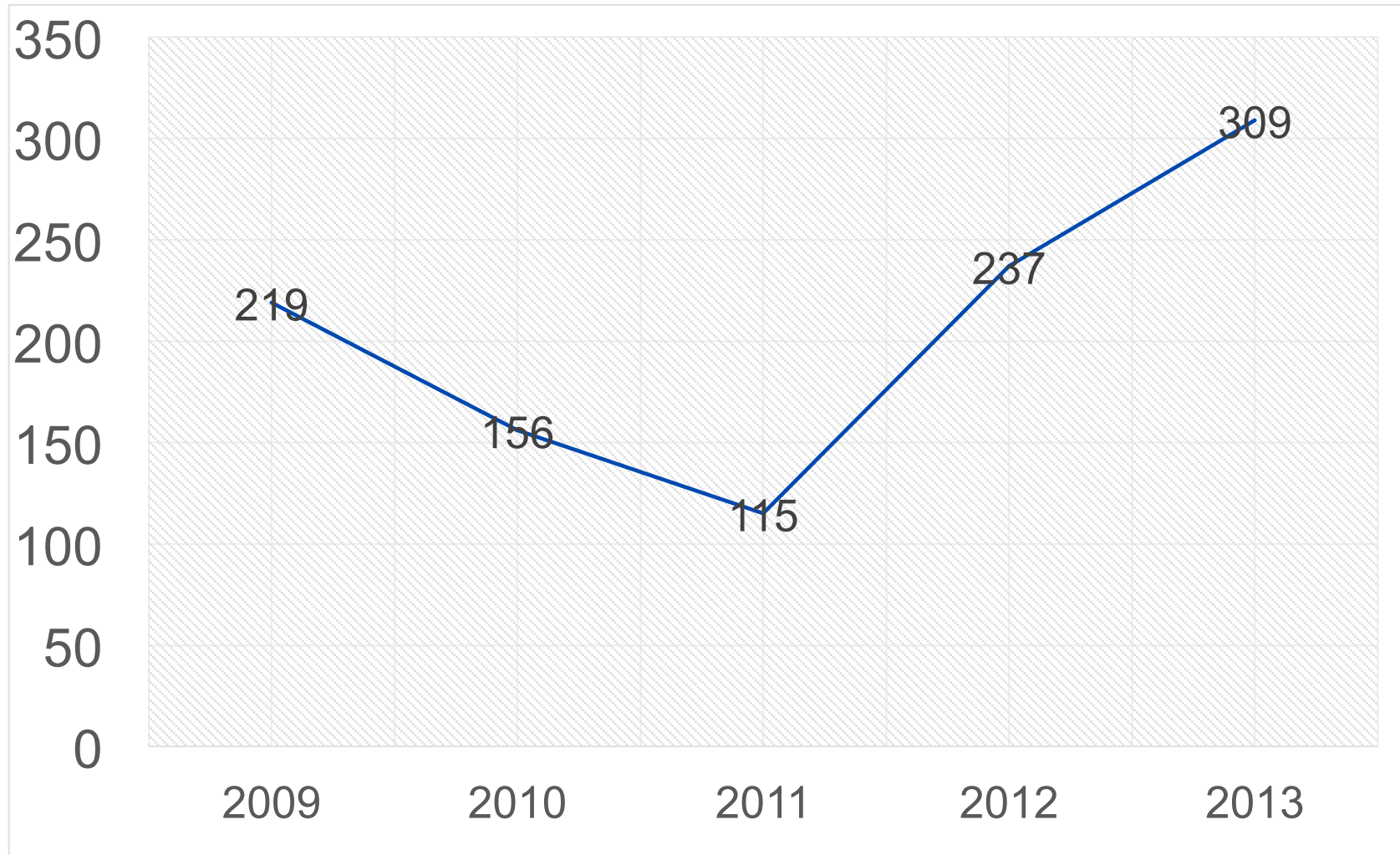
- **Introduced by ISOC as a pilot in 2008 in partnership with AfNOG and NSRC**
- **Objective was to localize the track and allow AfNOG to focus on more advanced topics**
- **More than 31 trainings since 2008 in 15 different countries**
  - **Trained over 1,000 participants (English + French)**
- **Materials used are from the initial AfNOG Track E0 on Intro to Unix System Admin and Services**
- **Facilitators from ISOC, NSRC and AfNOG community**



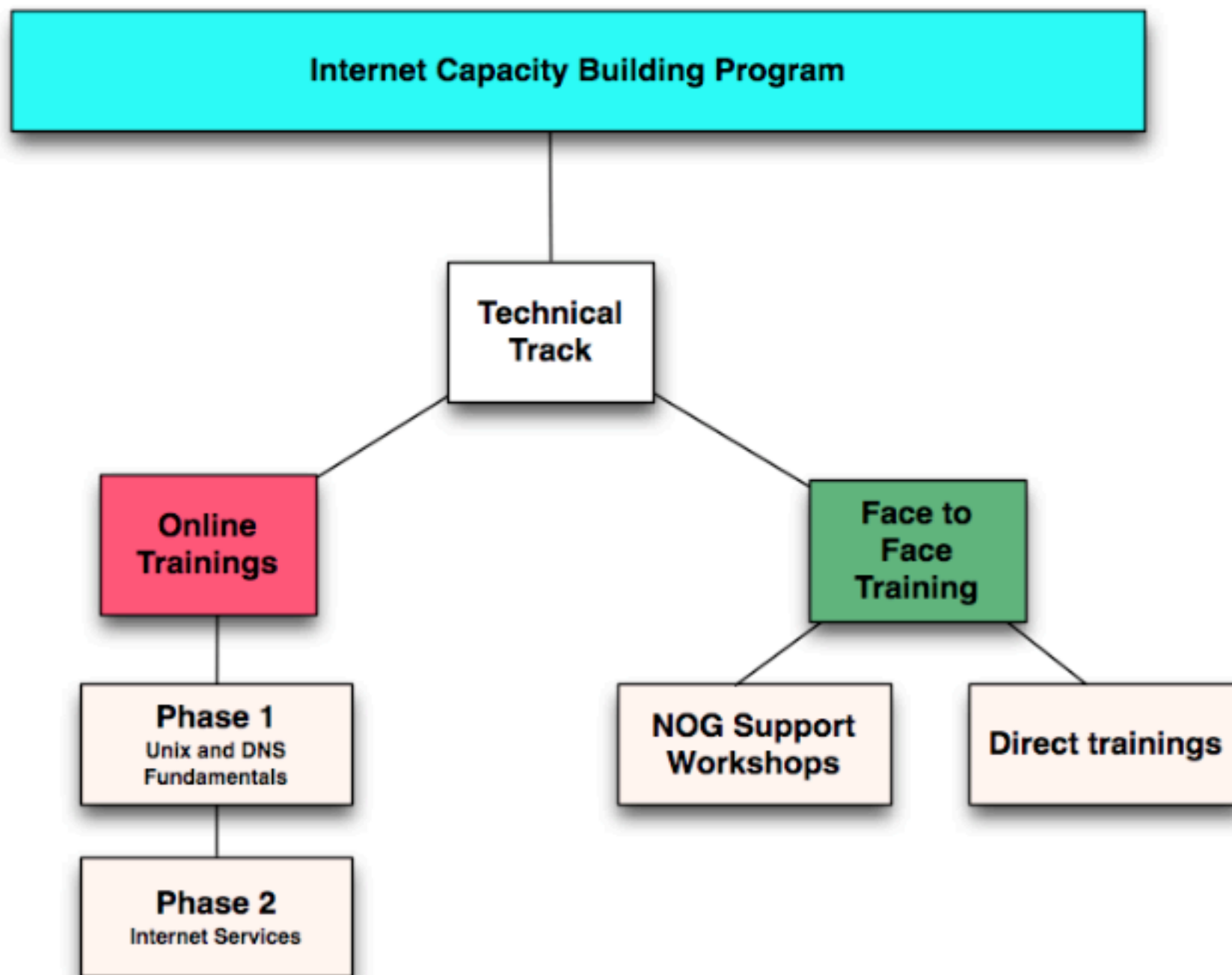
# Lessons learned from Localization Program

- **High demand for the program on the continent**
- **The program was well received because;**
  - **It is open source oriented**
  - **It covers open concepts**
  - **Is hands on oriented**
- **However, scalability was a challenge due to the size of the region and available resources –**
  - **only about 200 trainees per year**
- **Sustainability concerns due to long planning times and high costs associated with each workshop – average of USD 10,000 just for 30 trainees**
- **Few trainers able to offer trainings in French**
- **New program and vision launched to address the issues**

## Number of trainees at past workshops



## The Program Outline



# Face to Face (Offline) vs Online Training

Face to Face Trainings	Online Trainings
<ul style="list-style-type: none"> <li>✓ require lots of planning – 3 to 4 months prior to the event organizing participants, local host and logistics.</li> </ul>	<ul style="list-style-type: none"> <li>✓ An online training session can be put together in 4 weeks or less (assuming course is ready)</li> </ul>
<ul style="list-style-type: none"> <li>✓ are expensive</li> </ul>	<ul style="list-style-type: none"> <li>✓ are expensive in the beginning (acquiring the platform and hosting fees) but even out in the long run.</li> </ul>
<ul style="list-style-type: none"> <li>✓ do not scale</li> </ul>	<ul style="list-style-type: none"> <li>✓ can scale to large numbers with proper infrastructure.</li> </ul>
<ul style="list-style-type: none"> <li>✓ depend on the facilitator maintaining high standards.</li> </ul>	<ul style="list-style-type: none"> <li>✓ materials can be updated when necessary and are always available. Multiple facilitators can be made available via mailing lists, online calls etc</li> </ul>
<ul style="list-style-type: none"> <li>✓ require the trainees to be done in a short time</li> </ul>	<ul style="list-style-type: none"> <li>✓ are more friendly to the trainee. 2 to 4 weeks</li> </ul>

<b>Face to Face Trainings</b>	<b>Online Trainings</b>
✓ <b>The right people don't always come for the trainings</b>	✓ <b>Trainees can take the course from their workplaces over the 4 weeks or take a 1 week off from work</b>
✓ <b>Face to face has a personal touch with real interaction between the trainers and the trainees</b>	✓ <b>Interaction with facilitators and other trainees mostly online</b>
✓ <b>Attrition – not a major issue</b>	✓ <b>Attrition – can be a major issue if not well managed</b>

# **Introduction to Network Operations Course (Phase 1)**

- **The online course took 9 months to develop**
- **Several experts involved in material preparation**
- **Online platform was successfully piloted in late 2014**
  - **Participants from South Africa, Ethiopia, Botswana, Kenya, Cameroon, Rwanda participated**
- **The Online course has been launched as of March 2015 (60 participants from TzNOG and KENET currently)**
- **Objective is to train participants over the course of 4 weeks in a moderated online course**
- **On Completion, participants are given a “Certificate of Completion” from ISOC**

# Objectives of the Course

**The objectives of the online course are to increase the technical hands on skill levels among upcoming Network and System Engineers - fresh graduates, new recruits or job seekers in Network and System Administration. The topics and concepts covered in the course include:**

- How to install a UNIX/Linux OS in a Virtual environment
- Networking concepts – IPv4 and IPv6 and the IETF
- How to install 3rd party software on a UNIX or Linux platform using Software management tools
- How to edit files in UNIX and Linux and create simple scripts
- How to build and activate a caching DNS Server and

**The course intends to provide trainees with real world skills useful to them in their careers and which will improve Internet services available in the continent**



## About the Intro to NetOps course

- **All one needs is a laptop/PC running a VirtualBox supported Operating System**
- **There are 9 modules spanning:**
  - ✓ Introduction to Unix
  - ✓ Introduction to Networking (IPv4 and IPv6)
  - ✓ Working with the Unix Shell and Intro to Shell Scripting
  - ✓ Editing with ViM
  - ✓ Introduction to the Domain Name System (DNS)
- **The course is practically oriented, trainees build a Unix server in a virtual environment then at the end run a Caching DNS server first on BIND then using UnBound**
- **Can be completed in 2 to 4 weeks**
- **Remote moderation, FaceBook weekly calls, TeamViewer**

## Who can take the course

**The course is aimed at novices wishing to learn/ reinforce knowledge on Unix/Linux, Networking and DNS. Slots are limited at the moment but will grow in time Its available to:**

- **African NRENS:**
  - Use it to increase skill levels among member University staff or NREN staff
  - Grow a community of skilled engineers who will then pass the knowledge to others
- **African NOGs:**
  - Use it to grow numbers in the NOG or start new NOGs
  - Increase skill levels of members who can then carry out trainings locally
  - Increase the NOG's popularity

# Some Screenshots of the Intro to NetOps Course

To access your lessons, click the down button to the left of each course to see the lessons within it.

Then click on the lesson name or the to launch.

e-Learning  
 Not Started

Information  
 In Progress

Launch  
 Complete

Certificate  
 Passed

Evaluation form  
 Failed

 Module status -- Not specified --

 Category -- Not specified --






### ^ Moderated Courses

^ 2014 Introduction to Network Operations		Status: In progress	Date: 06/04/2015				
<a href="#">Introduction to UNIX</a>	In progress	20/03/2015 12:31					
<a href="#">FreeBSD Installation</a>	In progress	11/02/2015 10:07					
<a href="#">Networking</a>	In progress	11/02/2015 10:10					
<a href="#">Working with FreeBSD Ports</a>	In progress	12/03/2015 15:58					
<a href="#">Working with the UNIX shell</a>	In progress	12/03/2015 15:44					
<a href="#">Editing With VIM</a>	Not started						
<a href="#">Introduction to Shell Scripting</a>	In progress	12/03/2015 15:43					
<a href="#">DNS Fundamentals</a>	In progress	06/04/2015 08:34					
<a href="#">Domain Name System (DNS)</a>	In progress	12/03/2015 16:06					

## Introduction

The **Domain Name System (DNS)**<sup>[1]</sup> is a hierarchical distributed naming system for computers, services, or any resource connected to the Internet or a private network.

The DNS translates easily memorized domain names to the numerical IP addresses needed for the purpose of locating computer services and devices worldwide.

Computers use IP addresses to identify each other. This system works well, so why do we need to identify hosts by name? There are two main reasons:



Firstly, giving a host a name makes it much easier for people to remember. Remembering to type `www.example.com` is much easier than remembering `192.0.2.1`.

Secondly, computers may be moved between networks and their IP address would change. Having to tell everyone that a website has moved to a new IP address would be a major task.

The Domain Name System provides a worldwide, distributed and resilient querying service that is a key infrastructure of the Internet.



## Layers TCP/IP Model

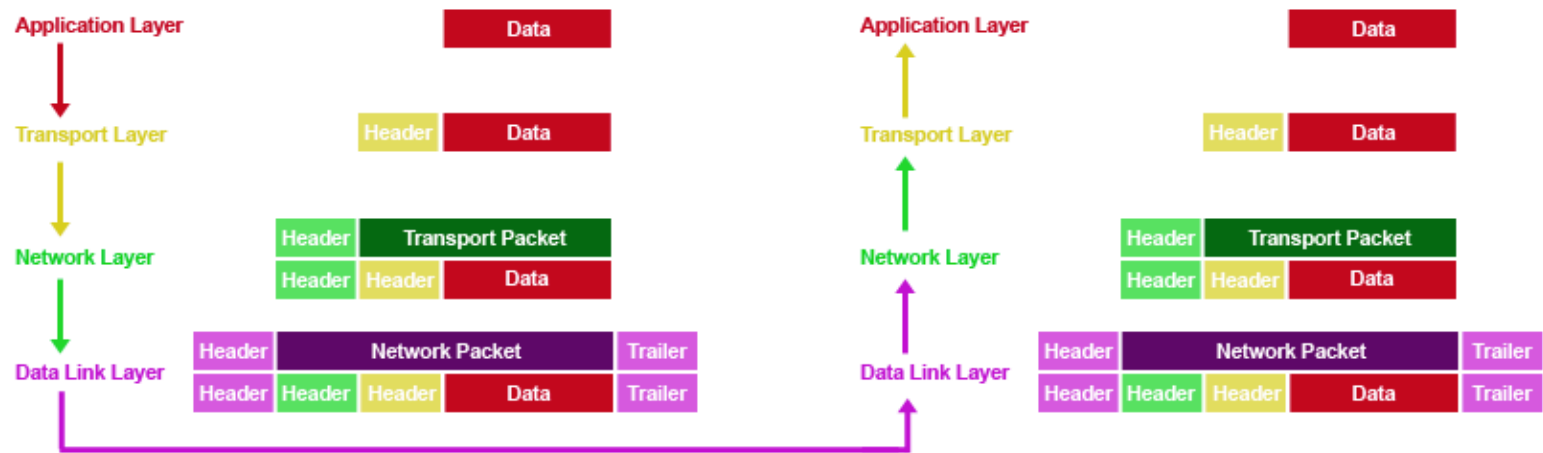
The notion of layers in networking helps us to understand what happens to packets of data as they travel from the transmitting user to the receiving user. This process is termed encapsulation and the reverse of this process is termed decapsulation.

### Encapsulation

When data moves from the upper layer to lower layer in the TCP/IP model, each layer adds relevant information, known as a **header**, alongside the data. The header, and data from the upper layer becomes the data that is repackaged with lower layer's header.

### Decapsulation

Decapsulation occurs when data is received by the receiving user, or destination computer. Each layer unpacks the corresponding header and uses the header's information to deliver the data packet.





## EVENTS



Create Event

**Ren Junior**

April 4 at 4:05pm

#cd /usr/ports/ports-mgmt/portupdrage

No such file or directory

as image bellow

```
pkg_add: missing package name(s)
usage: pkg_add [-oifFrRMSK] [-t template] [-p prefix] [-P prefix] [-C chrootdi
r]
           pkg-name [pkg-name ...]
root@ari:/home/ren # make fetchindex
make: don't know how to make fetchindex. Stop
root@ari:/home/ren # cd /usr/ports/shells/zsh
/usr/ports/shells/zsh: No such file or directory.
root@ari:/home/ren # cd /usr/ports/port-mgmt/portupgrade
/usr/ports/port-mgmt/portupgrade: No such file or directory.
root@ari:/home/ren # exit
exit
ren@ari:~ % su
Password:
root@ari:/home/ren # cd /usr/ports/port-mgmt/portupgrade
/usr/ports/port-mgmt/portupgrade: No such file or directory.
root@ari:/home/ren # make -dbatch install clean
make: illegal argument to d option -- b
usage: make [-BPSXeiknpqrstv] [-C directory] [-D variable]
           [-d flags] [-E variable] [-f makefile] [-I directory]
           [-j max_jobs] [-m directory] [-U variable]
           [variable=value] [target ...]
root@ari:/home/ren # make -DBATCH install clean
make: don't know how to make install. Stop
root@ari:/home/ren #
```

Like · Comment



Juvenaliz Mujvane likes this.

✓ Seen by 9

**Maureen Wanja** Please run

#cd /usr/ports/ports-mgmt/portupgrade

#make -DBATCH install clean... [See More](#)

April 4 at 4:19pm · Like

**Ren Junior** reply no such file or directory

April 5 at 2:03pm · Like

**Ren Junior** sorry i realized i didn't follow well installation procedure i was

skipping other option like i chose tcsh insteady of csh and i didn't install ports

19 hrs · Like



Write a comment...



## Understanding the Output from DIG

- ▶ status:
- ▶ flags:
- ▶ ANSWER:
- ▶ ANSWER SECTION:
- ▶ TTL (3600)
- ▶ AUTHORITY SECTION: ✓
- ▶ Query time: ✓
- ▶ SERVER: ✓

```

; <<>> DiG 9.8.4-P2 <<>> @zoe.dns.gh. downloads.dns.gh. a
; (1 server found)
;; global options: printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 34963
;; flags: qr aa rd; QUERY: 1, ANSWER: 2, AUTHORITY: 3, ADDITIONAL: 0
;; QUESTION SECTION:
;downloads.dns.gh.
;; ANSWER SECTION:
downloads.dns.gh.
zoe.dns.gh.
;; AUTHORITY SECTION:
dns.gh.          3600    IN      NS      zoe.dns.gh.
dns.gh.          3600    IN      NS      mantse.gh.com.
;; Query time: 275 msec
;; SERVER: 147.28.0.23#53(147.28.0.23)
;; WHEN: Wed Jan 29 10:39:14 2014
;; MSG SIZE rcvd: 43
    
```

**Server**

Always check that the server that gave the response is the one you requested from as the request may have gone to another server.

Click on each of the buttons above to find out more about each highlighted section in the sample output from dig.



## Testimonials from online course participants

***Dorcas, a lady from Uganda:*** "Quality content, always accessible; not at any one point was the course page inaccessible; so precise and explanatory. Very good for first time users of Unix."

***Otieno, a gentleman from Kenya:*** "The 2014 Introduction to Network Operations was very educative. The lessons were well structured and adequate references and comparisons provided. ....I also liked very much the simulations of FreeBSD installation, editing with VIM and Introduction to Scripting. This provided a very practical platform for learning and understanding the lessons. "

***Jean-Baptiste, a gentleman from Cameroon -*** "The illustrations and pictures were very useful for conveying meaning. I also liked the practical exercises".

***Abraham, a gentleman from Ethiopia :*** The Course materials are very helpful and interesting to learn and the methodology also nice.

***Nkosikhona, a gentleman from South Africa:*** "Coverage of the material and step by step instruction on performing tasks on FreeBSD VM (was very good)"

# Future Plans for the courses

## **Future plans for the Online courses**

- **Once trainees complete the Introduction to Network Operations Course, more courses will be made available to them including:**
  - ✓ **Introduction to Wireless**
  - ✓ **Introduction to IPv6**
  - ✓ **Phase 2 – Internet Services**
- **Phase 1 of the online course will be translated to French**
- **Phase 2 of the Online course will also be developed and be made available to those who complete Phase 1**



*Any Questions?*

**Thank You!**

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