

UbuntuNet - Connect 2017

Governance model for Educational Roaming (eduroam) in African research institutions

2 -3 November 2017



National Institute of
Allergy and
Infectious Diseases

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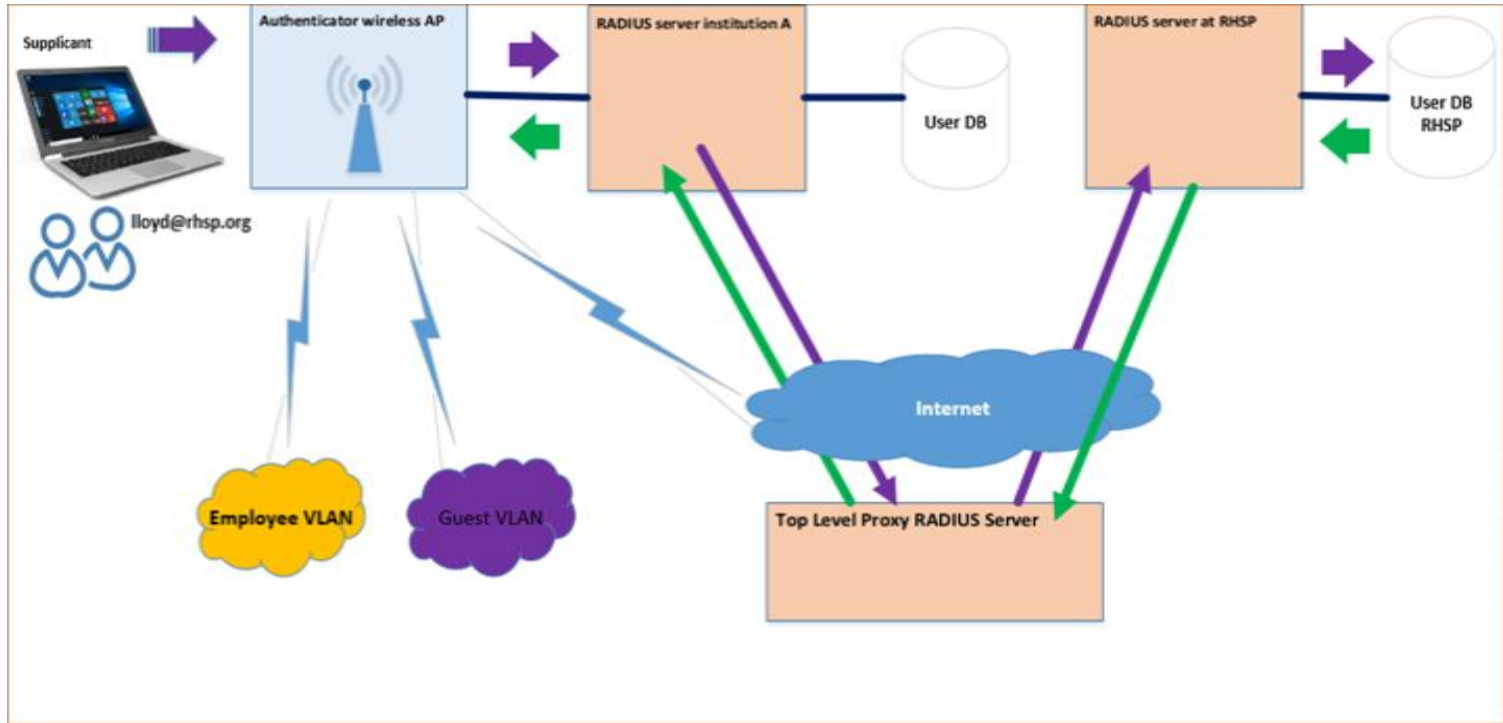
Office Of Cyber Infrastructure and Computational Biology

- **National Institute of Allergy and Infectious Diseases – NIAID**
 - One of 27 institutes of the NIH whose mission is to conduct and support basic and applied research to better understand, treat, and ultimately prevent infectious, immunologic and allergic diseases
 - OCICB International program began in 1998 to support scientific collaborations Of the NIAID to support malaria research in West Africa
 - **NIH ICER Uganda** : Collaboration with Rakai Health Sciences Program whose research mainly focuses on HIV related studies
 - **NIH ICER India**: Collaboration with the National Institute Of Research and Tuberculosis with sites at Chennai and Madurai
 - **NIH ICER Mali**: Collaboration with University of Medicine at Bamako with sites in Bamako, Doneguebougou, Bankoumana, Kalifabougou and Oulessebougou.

eduroam

- eduroam is a user friendly solution that provides a common Wi-Fi network (SSID) at all participating universities and research organizations world wide.
- Unlike the typical model of “guest” networks, this system **provides a real identity to which network administrators and security staff can map both traffic and activity to a user.**

Eduroam infrastructure

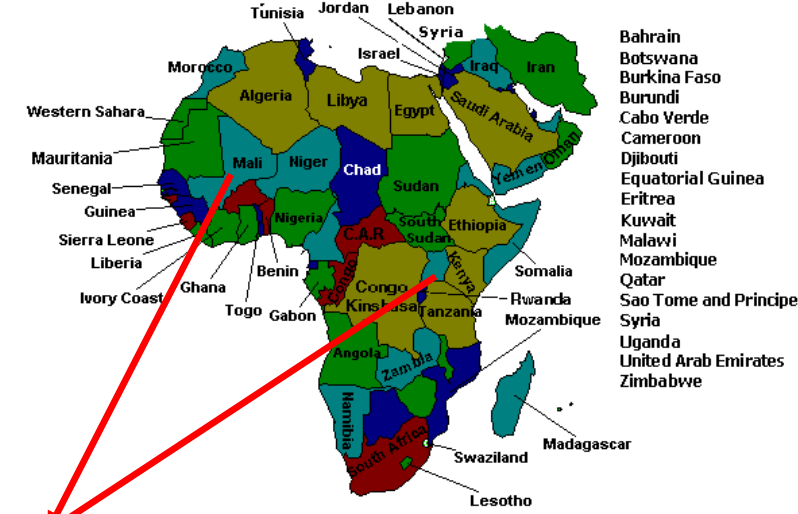
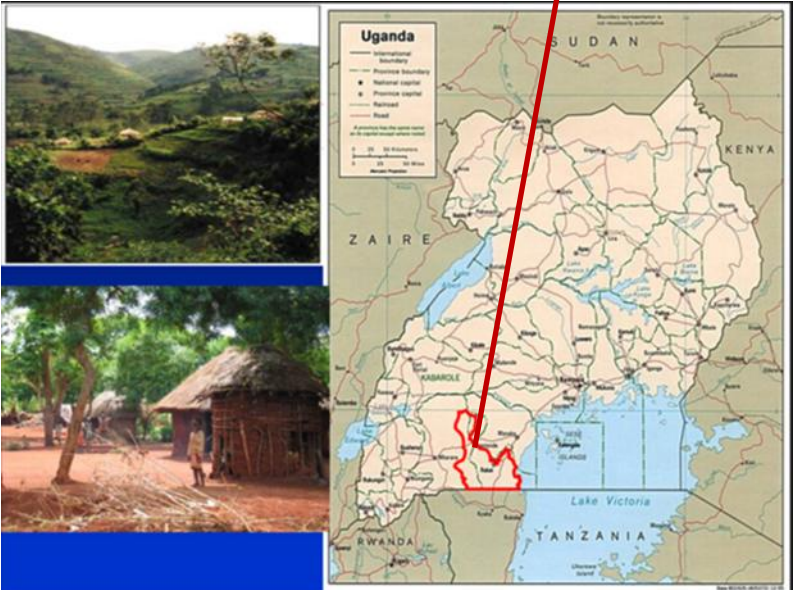


Why we implemented eduroam

- So that scientists and administrators at our sites could easily access internet more securely while roaming at eduroam participating institutions world wide.
- Scientists and administrators from other institutions world wide to access internet more securely at our sites.

NIH-NIAID sites where we deployed eduroam

Rakai Health sciences Program



NIH-NIAID International centers of Excellence in Research at Uganda and Mali

Africa National Roaming Operators

Number of service locations per NRO/NREN can be found in the table below. Additional information is available [here](#).

Europe

Africa

APAN

SOAM

NOAM

Country	NREN/NRO	Number of service locations
Algeria	ARN	N/A
Kenya	KENET	10
Malawi	MAREN	4
Morocco	MARWAN	4
Qatar	QNL	N/A
Saudia Arabia	KAUST	N/A
South Africa	SANREN	67
Uganda	RENU	7
United Arab Empires	Ankabut	N/A
Zambia	ZAMREN	N/A



European Commission Information Society and Media

categories of internet resources on eduroam SSID - Kalisizo

Meraki
CISCO

ORGANIZATION
IBRSP

NETWORK
Uganda Kalisizo

Network-wide

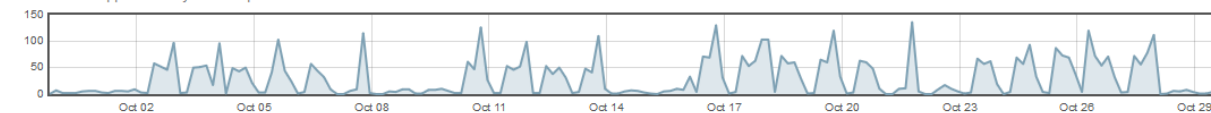
Switch

Wireless

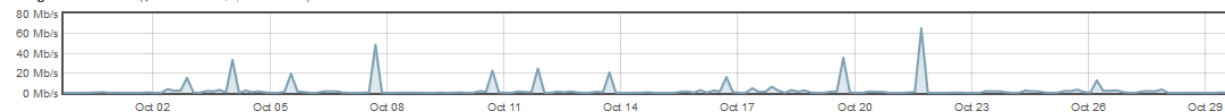
Organization

Traffic analytics for access points for the last 30 days on SSID: eduroam

Client counts approximately 288 unique clients



Usage 757.64 GB (↓ 667.88 GB, ↑ 89.76 GB)



Application	Destination	Protocol	Port	% Usage	Usage ▼	Sent	Received	Flows	Active time ⓘ	# clients
YouTube	-	-	-	7.8%	59.41 GB	1.21 GB	58.20 GB	42992	9 days	69
Google HTTPS	-	-	-	1.9%	14.60 GB	11.08 GB	3.52 GB	146203	9 weeks	148
Miscellaneous secure web	mmg.whatsapp.net	TCP	443	1.6%	11.79 GB	655.7 MB	11.15 GB	11480	10 days	119
Miscellaneous secure web	fbcdn.net	TCP	443	1.3%	9.97 GB	250.8 MB	9.72 GB	8658	5.1 days	40
apple.com	-	-	-	0.9%	7.11 GB	438.3 MB	6.69 GB	9088	4.2 days	13
iTunes	-	-	-	0.9%	6.88 GB	150.6 MB	6.73 GB	2457	20 hours	11
Facebook	-	-	-	0.5%	3.95 GB	196.2 MB	3.76 GB	181991	20 days	132
Miscellaneous secure web	default0.opera-proxy.net	TCP	443	0.4%	3.09 GB	92.9 MB	2.99 GB	5612	16 hours	1
UDP	188.166.87.249	UDP	1194	0.2%	1.82 GB	117.0 MB	1.70 GB	1	4.1 hours	1
Web based email	mail.rhsp.org	TCP	443	0.2%	1.77 GB	370.0 MB	1.41 GB	9973	9 days	52
Miscellaneous secure web	pps.whatsapp.net	TCP	443	0.2%	1.54 GB	126.2 MB	1.42 GB	2931	2.6 days	109
Google Drive	-	-	-	0.2%	1.45 GB	58.1 MB	1.39 GB	2139	30 hours	72
UDP	188.166.78.36	UDP	1194	0.2%	1.25 GB	100.7 MB	1.15 GB	3	4.9 hours	1

Categories of internet resources on eduroam SSID - Entebbe

Meraki

ORGANIZATION

IBRSP

NETWORK

Uganda Entebbe Wireless

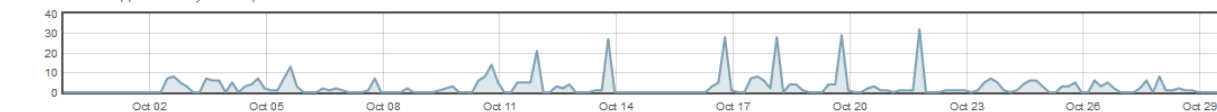
Network-wide

Wireless

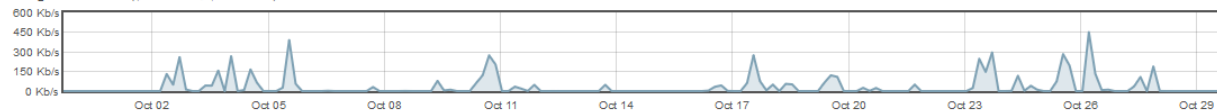
Organization

Traffic analytics for the last 30 days on SSID: eduroam

Client counts approximately 64 unique clients



Usage 10.31 GB (↓ 8.78 GB, ↑ 1.53 GB)



Application	Destination	Protocol	Port	% Usage	Usage ▼	Sent	Received	Flows	Active time ⓘ	# clients
YouTube	-	-	-	15.0%	1.55 GB	35.3 MB	1.51 GB	1705	5.9 hours	4
Google HTTPS	-	-	-	7.8%	826.3 MB	701.1 MB	125.2 MB	7374	3.5 days	13
Miscellaneous audio	shaincast.caster.fm	TCP	34777	6.7%	709.8 MB	18.2 MB	691.6 MB	12	12 hours	1
Miscellaneous secure web	mmg.whatsapp.net	TCP	443	6.1%	640.1 MB	41.9 MB	598.2 MB	386	11 hours	9
Google Drive	-	-	-	4.2%	440.3 MB	14.3 MB	426.0 MB	38	50 minutes	3
apple.com	-	-	-	3.5%	367.3 MB	150.8 MB	216.5 MB	984	12 hours	5
iTunes	-	-	-	2.1%	220.6 MB	3.2 MB	217.5 MB	113	1.5 hours	3
Miscellaneous secure web	graph.instagram.com	TCP	443	1.6%	170.4 MB	4.4 MB	166.0 MB	335	3.3 hours	1
Citrix Online	-	-	-	0.8%	83.9 MB	8.0 MB	76.0 MB	45	2 hours	2
Web based email	mail.rhsp.org	TCP	443	0.8%	82.3 MB	7.6 MB	74.7 MB	3053	22 hours	4
Miscellaneous secure web	r4---sn-5hnedn7e.gvt1.com	TCP	443	0.7%	74.0 MB	3.6 MB	70.4 MB	1	2 minutes	1
Miscellaneous secure web	r12---sn-5hne6ne6.gvt1.com	TCP	443	0.7%	70.4 MB	2.2 MB	68.2 MB	1	2 minutes	1
Miscellaneous secure web	scontent-frt3-2.cdninstagram.com	TCP	443	0.7%	69.4 MB	1.5 MB	67.9 MB	60	34 minutes	1

Categories of internet resources on eduroam SSID - Bamako

Meraki

ORGANIZATION

IBRSP

NETWORK

Mali Bamako

Network-wide

Security appliance

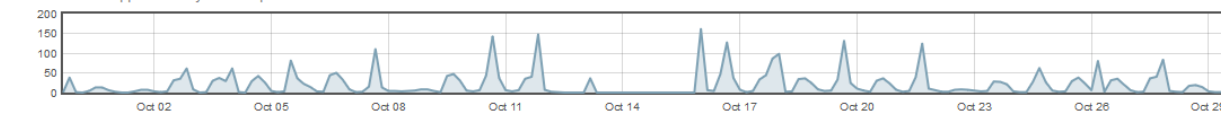
Switch

Wireless

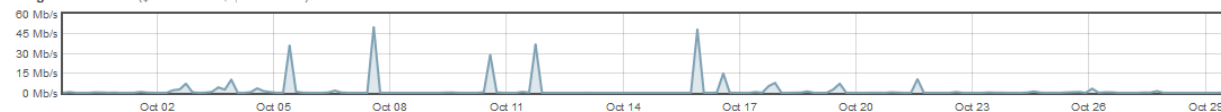
Organization

Traffic analytics for access points for the last 30 days on SSID: eduroam

Client counts approximately 281 unique clients



Usage 530.47 GB (↓ 488.06 GB, ↑ 42.42 GB)



Application	Destination	Protocol	Port	% Usage	Usage ▼	Sent	Received	Flows	Active time ⓘ	# clients
Software updates	au.download.windowsupdate.com	TCP	80	1.6%	8.51 GB	192.5 MB	8.32 GB	38576	17 hours	16
Software updates	b1.download.windowsupdate.com	TCP	80	1.4%	7.66 GB	101.3 MB	7.56 GB	5014	10 hours	3
Miscellaneous secure web	fbcdn.net	TCP	443	0.9%	4.87 GB	99.3 MB	4.77 GB	2107	37 hours	21
microsoft.com	-	-	-	0.7%	3.75 GB	128.3 MB	3.62 GB	14833	3.1 days	43
apple.com	-	-	-	0.7%	3.64 GB	200.0 MB	3.45 GB	4016	42 hours	23
UDP	95.85.41.112	UDP	15964	0.6%	2.92 GB	182.3 MB	2.74 GB	3	4.3 hours	1
Facebook	-	-	-	0.5%	2.87 GB	157.4 MB	2.72 GB	52908	5.1 days	40
Miscellaneous web	ota.tecno-mobile.com	TCP	80	0.4%	2.23 GB	51.1 MB	2.18 GB	28	3.6 hours	2
Miscellaneous secure web	akamai.net	TCP	443	0.4%	2.16 GB	57.7 MB	2.11 GB	338	6.1 hours	11
Software updates	download.windowsupdate.com	TCP	80	0.4%	2.08 GB	43.5 MB	2.03 GB	12289	2.9 hours	10
iCloud	-	-	-	0.3%	1.73 GB	1.65 GB	75.7 MB	2882	18 hours	11
Google HTTPS	-	-	-	0.3%	1.56 GB	1.10 GB	476.7 MB	49379	11 days	83
Miscellaneous secure web	cloudfront.net	TCP	443	0.3%	1.45 GB	151.5 MB	1.30 GB	1804	20 hours	23

Our experience for the last one year

- How do we know our eduroam is working globally?
 - eduroam could be working locally but not outside the country
- Roaming users having infected pcs with malware, viruses, worms, etc
- Besides internet browsing, what other services might a roaming user be interested in?
- eduroam cat unavailability for some countries.

eduroam cat installer available to only 4 African Countries

all countries

Argentina

Armenia

Australia

Austria

Belgium

Brazil

Bulgaria

Canada

Chile

Colombia

Costa Rica

Croatia

Czech Republic

Denmark

Ecuador

Estonia

Finland

France

GEANT

Estonia

Finland

France

GEANT

Georgia

Germany

Greece

Hungary

Iceland

Ireland

Israel

Italy

Latvia

Lithuania

Luxembourg

Malawi

Malaysia

Mexico

Morocco

Netherlands

Norway

Pakistan

Peru

Philippines

Poland

Portugal

Russia

Serbia

Slovakia

Slovenia

South Africa

Spain

Sweden

Switzerland

Turkey

Uganda

Ukraine

United Kingdom

Uruguay

U.S.A.

MALI ?

INDIA ?



How we are addressing our concerns

- put in place a configuration policy
 - Bandwidth Caps
 - Content filtering on what users can access
 - Network behavioral guidelines – **On splash Page**
 - Put eduroam SSID on separate SSID and applied firewall and traffic shaping rules
 - Use eduroamCat to check realm reachability and the installer for managing connectivity to the eduroam SSID.

Proposed Next steps

- Need for eduroam governance body at the African Level
- Make eduroamCat available to all NROs and SPs where eduroam has been deployed in Africa
- Confederation top-level RADIUS Server at the African Level
- Have updated lists for NROs and in country SPs at the eduroam global body website.
 - This is helpful for the roaming users to know where they can access eduroam worldwide

Acknowledgements

- Michael Tartakovsky, CIO NIAID/NIH, Director OCICB
- Christopher J Whalen, IBRSP/OCICB/NIAID/NIH
- Economou Matthew , IBRSP/OCICB/NIAID/NIH
- Brian k Moyer, IBRSP/OCICB/NIAID/NIH
- Ben Kakeeto, NIAID Uganda ICER
- Rodgers Kimera, NIAID Uganda ICER
- Moses Mubiru, NIAID Uganda ICER

