The global free wi-fi Roaming Service

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Covering…

- What the service provides
- Background
- Overview of the technology
- How it works in practice
- The Location Independent Networking (LIN) trial
- The ERNET Roaming service
- The eduroam federation
- Parallel international effort

What is eduroam

- eduroam (Education Roaming) is the secure, world-wide roaming access service.
- Allows users to securely access the internet free of cost across campus and also at visiting eduroam enabled participating institutions using their *home credentials*.

The service

- Enhances user mobility
- Provides hassle free guest network access
- Promotes single sign-on
- Clip View

Problem Statement

- Students come with own mobile devices wanting to connect
- Visiting faculty and Scholars bound by complex policies at Institutions
- Different wireless networks on campus
- Overseas campuses access in different languages or require data roaming
- Regulations, complexity
- Running after Sysadmin at Guest Institution

Background

- Conceptualisation started in Europe in 2003
- Develop a location independent networking infrastructure to enable networks to support guest users in a transparent & secure manner
- Proof of concept tests carried out on RADIUS (Remote Authentication Dial-In User Server) hierarchy

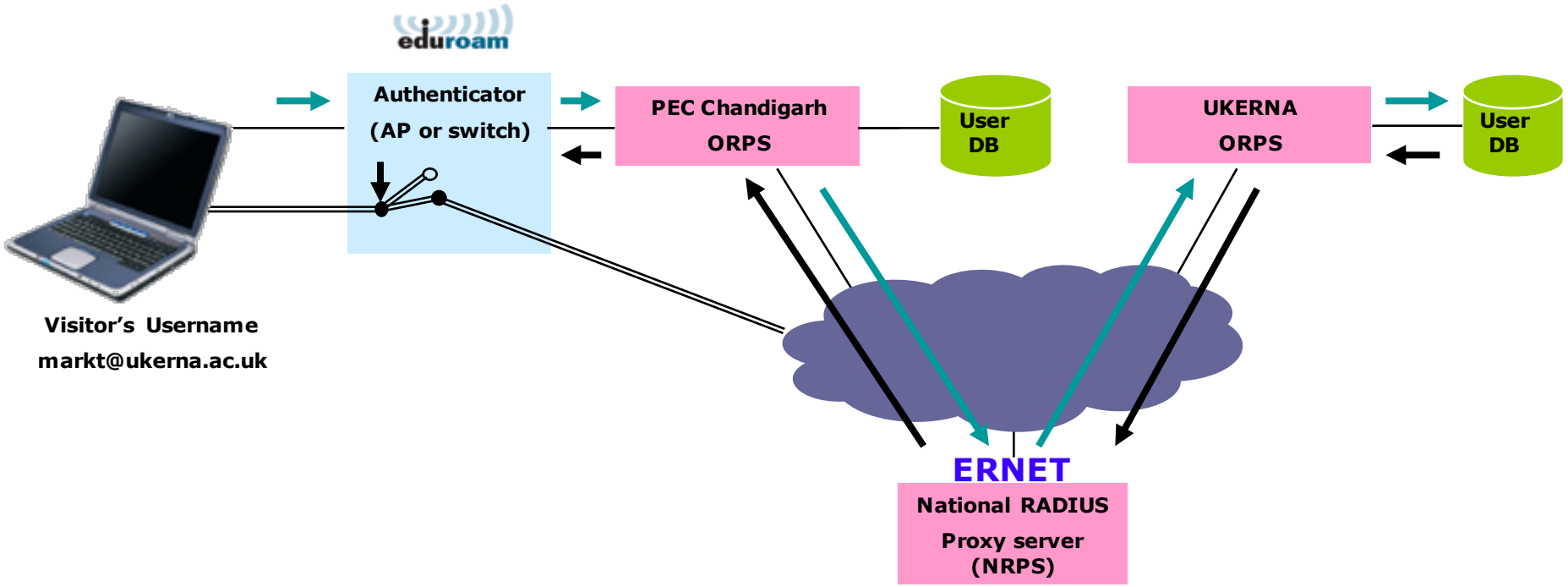
RADIUS Hierarchy

- **Organisational** RADIUS Proxy Server (ORPS)
- **National** RADIUS Proxy Server (NRPS)
- **International** RADIUS Proxy Server (IRPS)

Federated Trust Model

- Participating institutions sign-up to the federation policy
- Institutions trust each other to keep their user databases up to date
- Network access is granted to a visitor after their credentials have been verified by their home institution

For example…


eduroam
Authenticator
(AP or switch)
PEC Chandigarh
ORPS
User
DB
UKERNA
ORPS
User
DB
Visitor's Username
markt@ukerna.ac.uk
ERNET
National RADIUS
Proxy server
(NRPS)

Location Independent Networking (LIN) Trial

- January 2005 – January 2006
- 36 institutions in the UK
- Positive feedback from JANET community
- Transition to service

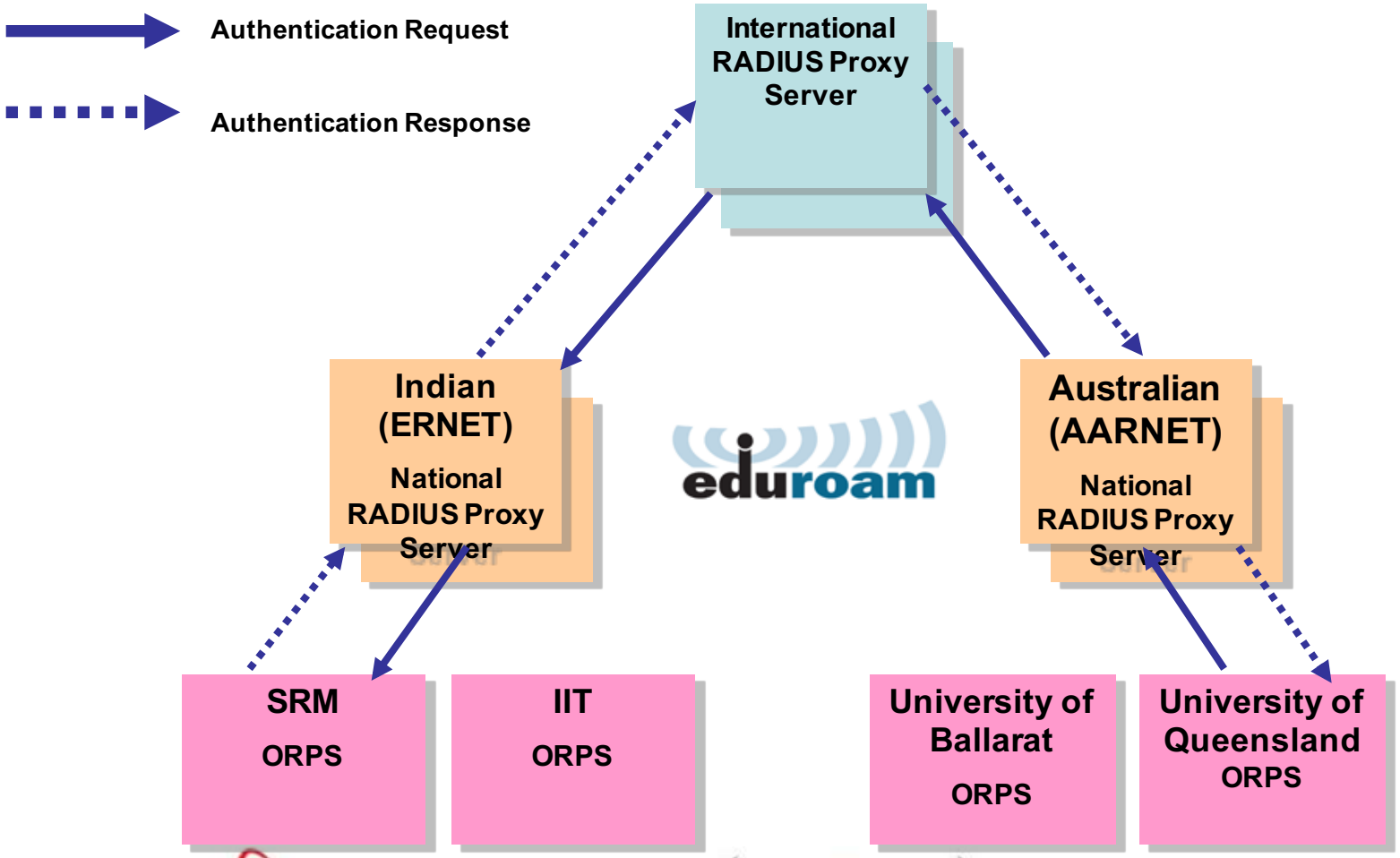
Indian eduroam status

- Explored in 2010 during discussions with AARNET
- Discussions and Technical inputs were collected 2010-11
- Demo setup to build technical capabilities – 2011
- Website operation in end of 2011
- Proposed to Diety and the project was sanctioned in early 2012
- National Infrastructure and International peering was established – early 2012
- ERNET Institutional Server established and Global roaming tested – 2012
- SRM Institutional Server tested successfully – mid 2012
- Successfully demonstrated in International Conference, Kolkotta – end 2012
- Resilient National eduroam infrastructure established – 2013
- Support team by ERNET
- Consultancy & Turnkey Implementation service by ERNET
- Online documentation: deploying, using and supporting the service
- Invitation to all stakeholders to join

eduroam federation

- European countries, US, Asia Pacific, Brazil
- Based on the same technology (RADIUS)
- IRPS hosted in Denmark and the Netherlands on behalf of TERENA and in Japan for AP, US
- Enabling international roaming

eduroam RADIUS Hierarchy



Opportunities

- Matured Technology
- 802.1x/ RADIUS / RADSEC technologies available with all vendors and even on open source
- All OS now support eduroam
- Man-in the middle attack stopped via Certificates
- Eduroam supplicants widely available for end devices
- Hassle free roaming service – Control with home Institution
- Enhanced productivity and Communication

National Proxy server running live from two location. i.e. Delhi & Bangalore.

Peering with different TLR international server

Users are able to avail the eduroam service both at Domestic and International level.

How to Join!!!

- Fulfill Technical Prerequisite…
- The institution needs to signup for eduroam services with ERNET India.
- The institution needs to provide visiting users to use the Internet through eduroam authentication.

Technical Prerequisite for User Institutions

- Institution should have internet connectivty.
- Should have wi-fi campus
- Should have ability to radiate “eduroam” ssid
- Should have server to run radius software
- The institution needs to provide visiting users to use the Internet through eduroam authentication.

eduroam Milestones in India

The National level .in FLR servers deployed successfully

flr1.eduroam.ernet.in & flr2.eduraom.ernet.in

More then 150 institutions server are deployed at different Institutions locations and connected with National server. E.g. IIT's, IIM's, IISc, NIT's, Universities etc.

All connected Indian Institutions are availing the roaming facility service in globe.

The Institutions eduroam server are created on Microsoft Windows Server , RedHat, CentOS, Ubuntu also integrated with SQL, AD, LDAP, DC, ADC etc..

- Web Portal has been created with domain eduroam.in & eduroam.ernet.in
- Created the survey form & Provide the help desk facility for availing eduroam user.
- Created the portal for Resetting/changing password.
- Created the Testimonials of institutions feedback.
- Providing Support to users and institutions.

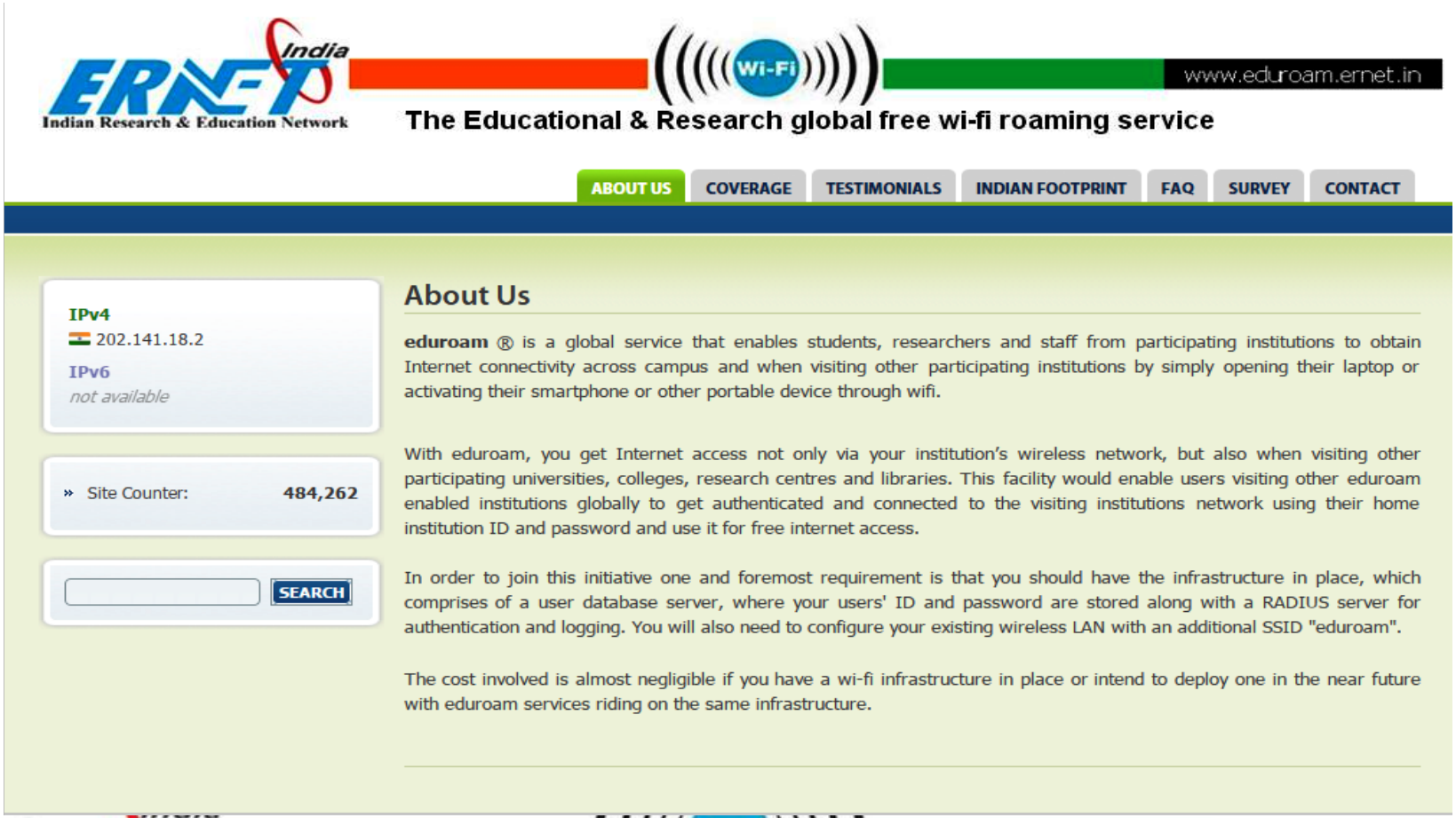
Testing done on various devices

- ✓ Ruckus Wi-Fi.
- ✓ Ruckus zone controllers.
- ✓ Ucopia with Ruckus controllers.
- ✓ Motorola Wi-Fi & Controllers
- ✓ Cisco Wi-Fi and Controllers.
- ✓ Cisco Linksys E900.
- ✓ Cisco ISE.
- ✓ Cisco Linksys E1200.
- ✓ Aruba Wi-Fi & Controllers.
- ✓ D-Link Wi-Fi & Controllers.
- ✓ Juniper Wi-Fi & Controllers.
- ✓ Aptilo Wi-Fi & Controllers.
- ✓ H3C Wi-Fi & Controllers.
- ✓ FortiGet Wi-Fi & Controllers

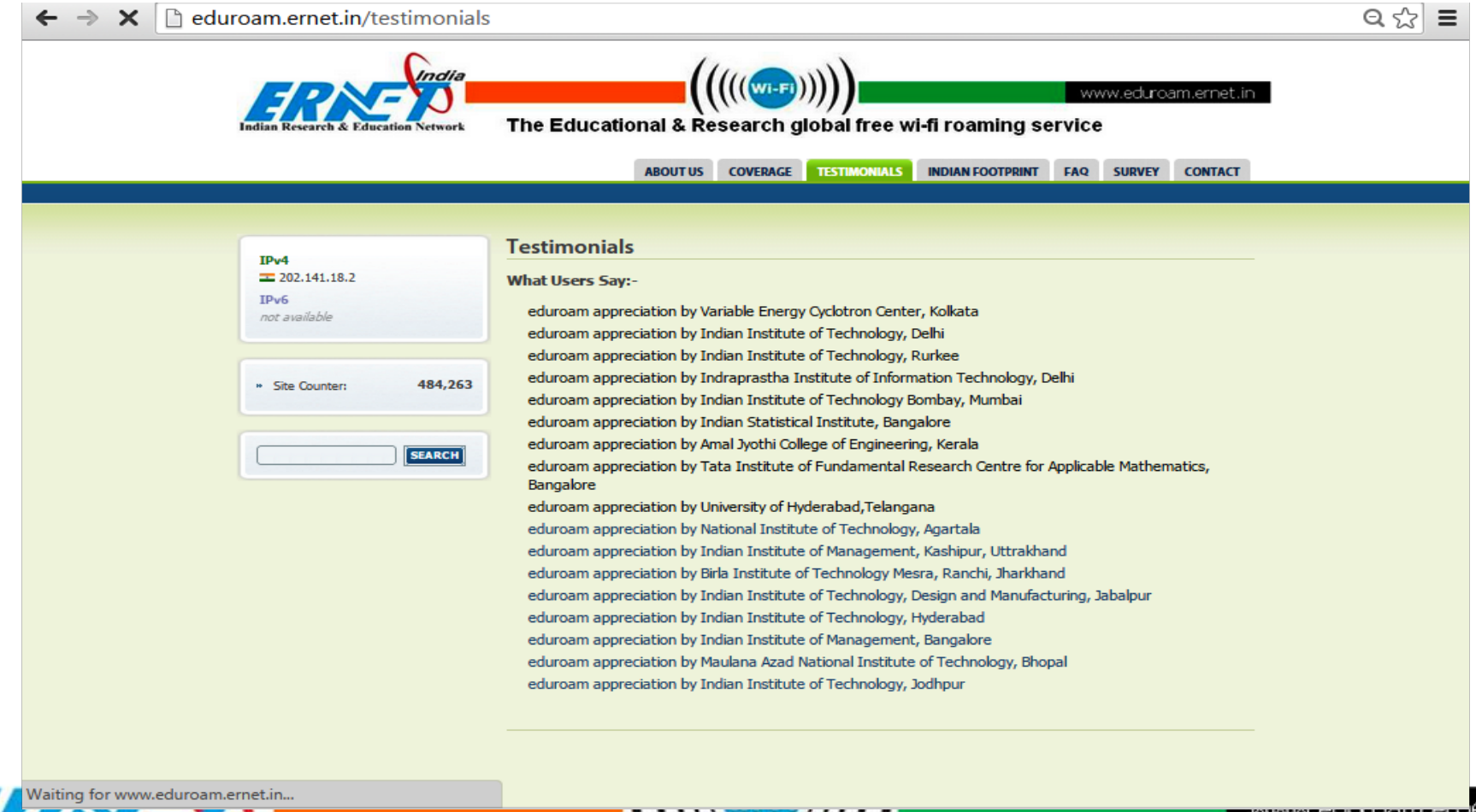
Testing done on various Mobile Device & OS

- ✓ Samsung Mobile.
- ✓ Sony Mobile
- ✓ Android OS.
- ✓ Apple (IOS).
- ✓ Mac OS.
- ✓ Nokia
- ✓ Plam OS.
- ✓ Samsung Bada OS.

www.eduroam.ernet.in



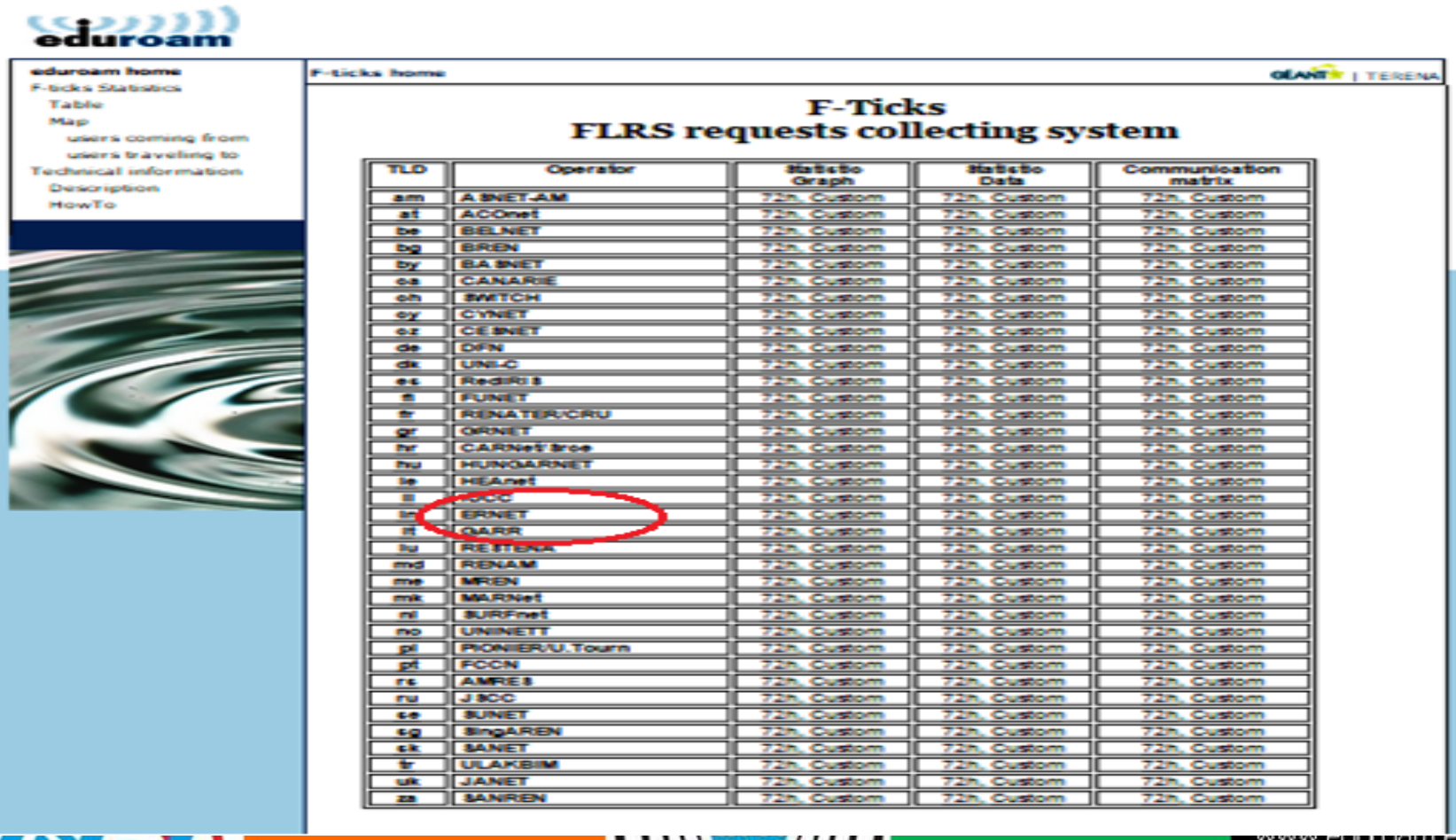
http://eduroam.ernet.in/testimonials



National Roaming Operators (NRO)

The Educational & Research global free wi-fi roaming service

World Map Of Participants



Eduroam Usages

ERNET India being a National Roaming Operator, only capture the usage of Statistics of roaming users, as part of eduroam service. Based on the same ,there have been following roaming sessions was established till April 2016

- Total number of user instances : 795909
- Instances of International user to India : 477565
- Instances of Indian Roaming user : 318344
- **Global Table**

How to configure Institutional server on Cent Os

1. Install these Packages

#yum install freeradius2 freeradius2-mysql freeradius2-utils mysql-server -y

2. Star MySql Services

service mysqld start or # service mysqld restart

3. Change password and security settings

#usr/bin/mysql_secure_installation

4. Login Mysql database

#mysql –u root –p

5. Give root password

6. Create database and Grand all privilege

mysql> CREATE DATABASE radius;

mysql> GRANT ALL PRIVILEGES ON radius.* TO radius@localhost IDENTIFIED BY "radpass";

mysql> flush privileges;

7. Import the tables for radius

mysql> use radius;

mysql> SOURCE /etc/raddb/sql/mysql/schema.sql

mysql> exit

8. Open /etc/raddb/sql.conf

#vi /etc/raddb/sql.conf

#Connection info

server = “localhost”

port = 3306

login = “radius”

password = “radpass”

#Database table configuration for everything except oracle

radius_db = “radius”

9. Open /etc/raddb/radiusd.conf

#vi /etc/raddb/radiusd.conf

Go to line no 735 and uncomment

$INCLUDE sql.conf

10. Open /etc/raddb/site-available/default

#vi /etc/raddb/sites-available/default

Uncomment the line containing 'sql' in the following section

✓authorize{}

✓accouting{}

✓session{}

11. Open /etc/raddb/site-available/inner-tunnel

#vi /etc/raddb/sites-available/inner-tunnel

Uncomment the line containing 'sql' in the following section

✓authorize{}

✓session{}

12. Open /etc/raddb/clients.conf

client IP {

secret = your secret here(Eduroam)

shortname = your VPN (IITK)

nastype = other

}

13. Open /etc/raddb/proxy.conf

realm DEFAULT {

authhost = Public IP

secret = your secret here (testing123)

shortname = yourVPN

nostrip

}

realm xyz.in {

authhost = LOCAL

}

14. Check radius is working ?

#service radiusd restart

radiusd –X

15. Create users for Eduroam Service

#mysql –u radius –p

Password

mysql> show databases;

mysql> use radius;

mysql> show tables;

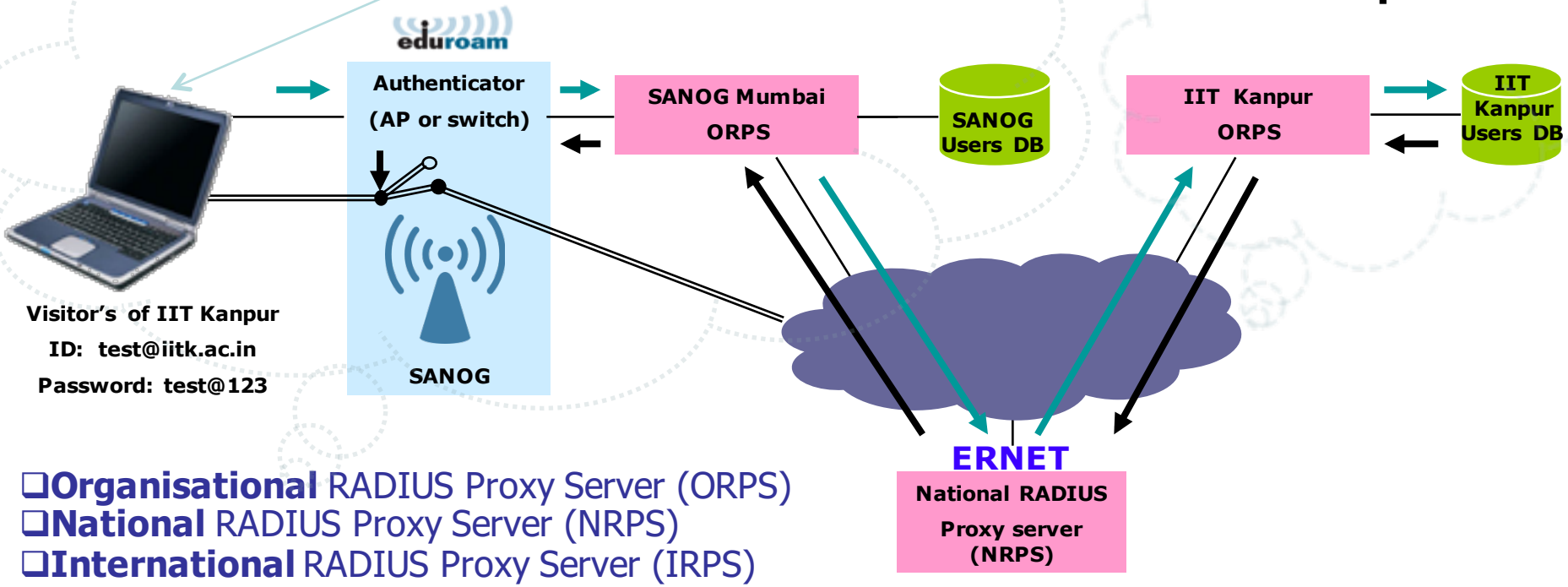
mysql> DESCRIBE radcheck;

mysql> INSERT INTO radcheck (id, username, attribute, op, value) VALUES (1, “test@ernet.in”, “User-Password”, “:=”, “password”);

mysql>exit;

lab demonstration

SANOG ⟺ IIT Kanpur



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Questions?

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