

ONE DAY CAPACITY BUILDING ON COMMUNITY NETWORKS FOR THREE MICRO-ORGANIZATIONS AT

ABUJA

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BY CITAD



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Course

Module 1. Introduction to Community Networks

The Centre for Information Technology and Development (CITAD) is implementing a project entitled **Supporting Community-led Approaches to Addressing the Digital Divide Nigeria** coordinated globally by the Association for Progressive Communications (APC) support from the United Kingdom's Foreign, Commonwealth and Development Office (FCDO) through their Digital Access Programme (DAP).

This is part of a global project to catalyze the flourishing of community networks as a means of connecting the unconnected

The project focuses on selected locally managed community networks in three regions, Africa, Asia and Latin America, to strengthen their impact, reach and sustainability

This group of community networks will form the core of a peer community that can connect and broaden support for community-based connectivity initiatives, nationally, regionally and internationally

The project will achieve its objectives through peer learning and exchange, awareness raising, technical assistance, capacity building for the development of scalable, innovative and sustainable networks, policy and regulatory advocacy and community mobilisation.

The project runs from 2020 to 2022

(1) What is Community Networks?

ISOC, the Internet Society defines community networks as “telecommunications infrastructure deployed and operated by a local group to meet their own communication needs”

Community Networks can be described as communications infrastructure, designed and erected to be managed for use by local communities,

This communication needs can be voice, data, etc and can be point of convergence for community to come together to address their common community problems. Community networks take different forms with some extending access using commercial networks, they are more appropriately described as providing connectivity to the first mile.

Beyond the definition of CN, the success story of the community networks across the globe has been awesome. It has proven as an educative tool for the community to grow its economic resources, given access to educate the people.

IMPORTANCE OF COMMUNITY NETWORKS

Community networks can facilitate the sharing of information between organizations, and thereby encourage co-operation and collaboration between them. This approach can be particularly useful to the voluntary sector, by pooling resources in this way, organizations can avoid duplication of effort; put clients in touch with other appropriate organizations and agencies; and meet the needs of their client groups more effectively and efficiently.

Community centers make ideal public access points, or nodes on the community network because they are often the hub of existing social networks. ICT can be used to reinforce these social networks by strengthening existing, and developing new relationships between community groups, organizations and individuals. A community center also provides the ideal setting for community run ICT training and education courses. Schools, public libraries,

access to voice and internet services that connectivity offers to rural populations in the supermarkets and even public places, in fact anywhere where people meet and communicate can be used to provide some form of online access.

❖ **Accessing E-content from rural communities:-**



Electronic content (e-content) which is also known as digital content refers to the content or information delivered over network based electronic devices or that is made available using computer network such as internet. According to Oxford dictionary ‘e-content is the digital text and images designed to display on web pages’. According to Saxena Anurag(2011) ‘E-content is basically a package that satisfies the conditions like minimization of distance, cost effectiveness, user friendliness and adaptability to local conditions’.

Well developed e-content can be delivered many times to different learners. Individual course components i.e. units, lessons and media elements such as graphics and animations can be re-used in different contexts

The purpose of e-content development is to create an information rich society. Every one in the society is empowered to create, receive, share and utilize information for their progress. Very well designed, developed and validated e-content will provide access to high quality meaningful digital content and serve as an effective virtual teacher.

❖ **Developing skills and expertise to improve employability**



Facilitating community access to the 'information society' in such a way allows individual and group utilization of ICT for social purposes. However, it also creates a local skills-base which can be harnessed by public and private sector alike for economic development purposes. Community networks therefore, by addressing educational and training needs, can stimulate an improvement in local people's employability by developing much sought after skills.

(2)WHAT SERVICES COMMUNITY NETWORKS OFFER

1 Voice Call



2 Data



3 Education/ E-learning



4 E Library



5 Digital Solutions



6 Digital Economy/ E-commerce



(3)COMMUNITY NETWORKS IN PRACTICE: Typology (types of community Networks)

Hotspot: A hotspot is a physical location where people can access the Internet, typically using Wi-Fi, via a wireless local area network (WLAN) with a router connected to an Internet service provider. Most people refer to these locations as “Wi-Fi hotspots” or “Wi-Fi connections.” Simply put, hotspots are the physical places where users can wirelessly connect their mobile devices, such as smartphones and tablets, to the Internet.



A hotspot can be in a private location or a public one, such as in a coffee shop, a hotel, an airport, or even an airplane. While many public hotspots offer free wireless access on an open network, others require payment.

Mobile hotspot: A mobile hotspot (sometimes called a portable hotspot) While a “regular” Wi-Fi hotspot is tied to a physical location, you can create a mobile hotspot by using your smartphone’s data connection to connect your laptop to the Internet. This process is called “tethering.” More on this process coming later.

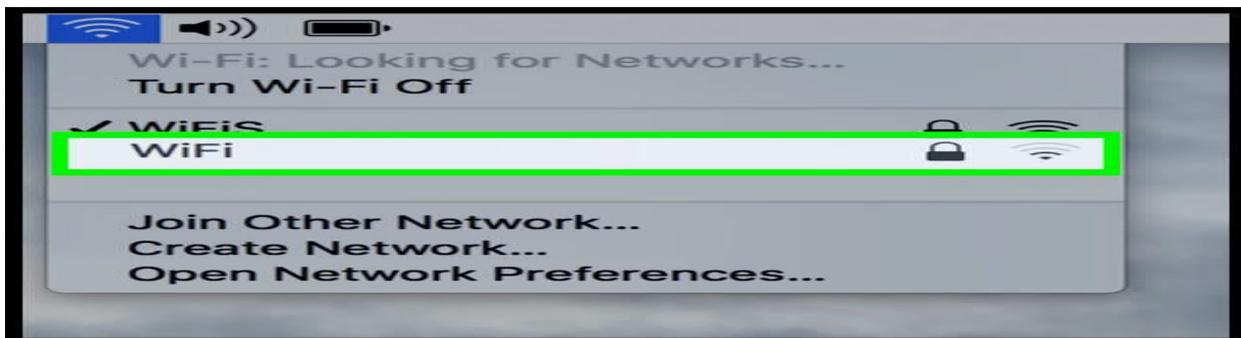


Access point (wireless access point): A wireless access point (WAP) is a networking device that allows a Wi-Fi compliant device to connect to a wired network. The WAP can either be physically connected to a router or be integrated into the router itself. A WAP is not a hotspot, which is the physical location where Wi-Fi access to a WLAN is available.

Wi-Fi: Wi-Fi is the technology that allows your smartphone or computer to access the Internet through a wireless connection. It uses radio signals to send and receive data between your enabled device and the WAP.



SSID: A service set identifier (more commonly known as an SSID) is the unique name of a wireless network. You'll need to know the name of the wireless network to connect to it. Your computer or smartphone can search for available wireless networks; often people name their network for easy identification—anything from “Bob’s phone” to “hotel guests” to “Get off my LAN.”



1- Public WiFi Hotspot

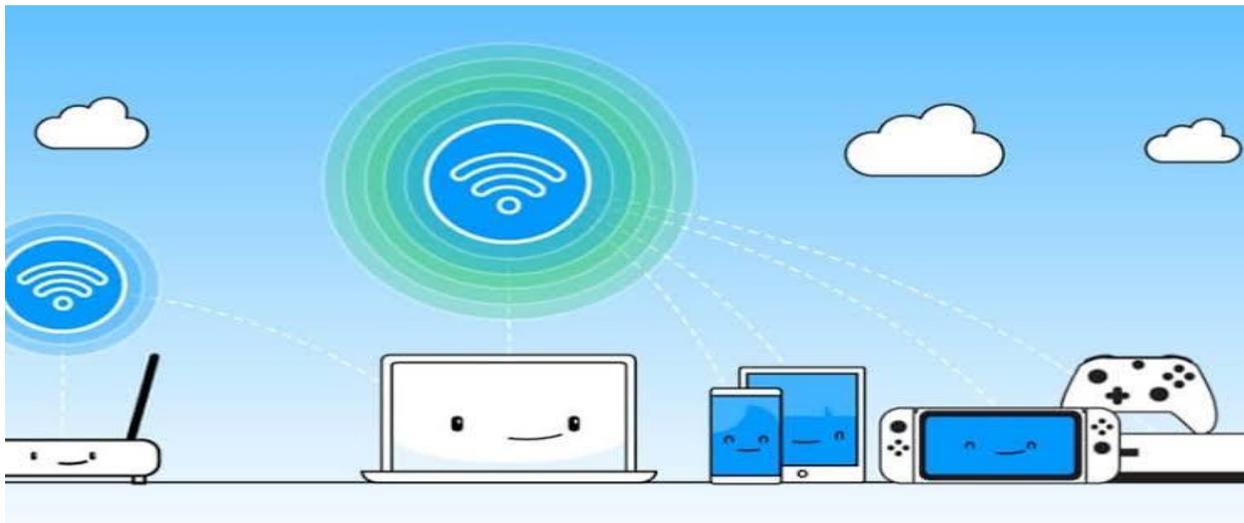
A public WiFi hotspot works, from the user's end, much like a WiFi network that you might find in your home or office. These hotspots transmit an internet connection using special wireless equipment, to create a WiFi network to which you can connect a tablet, smartphone, computer, or other device.

Public wifi hotspot is more vulnerable to cyber criminals, that it can be easily hacked or your information is visible to the host, and sometimes public wifi is free



2- Private wifi (Connect with confidence)

Private WiFi is a Virtual Private Network (VPN), the most secure way to surf, share, shop, bank, and do everything else online. No one will be able to intercept or see your WiFi signal.



3- Public Access Centre

a television channel on which any person can broadcast a program The community council meeting will be broadcast on public, often used before another noun public access television, public access channel.

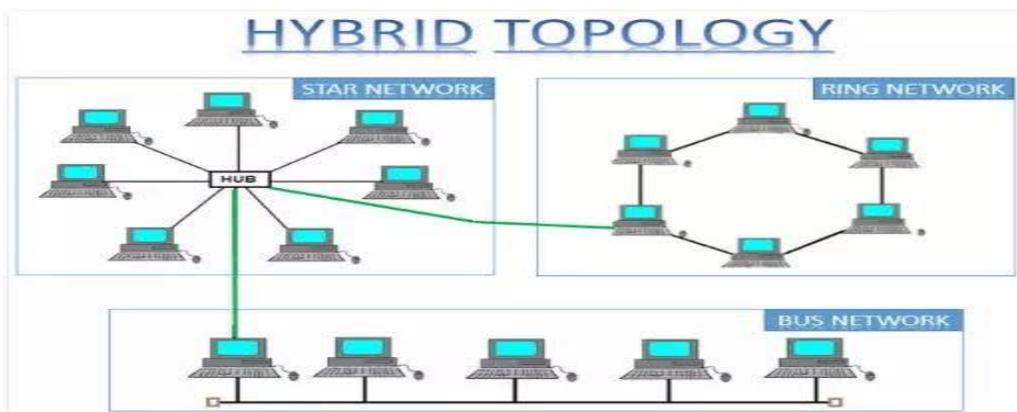
4- Mobile center

A call centre is a centralised office used for receiving call or sending call or enquiries by telephone.



5- Hybrid: -

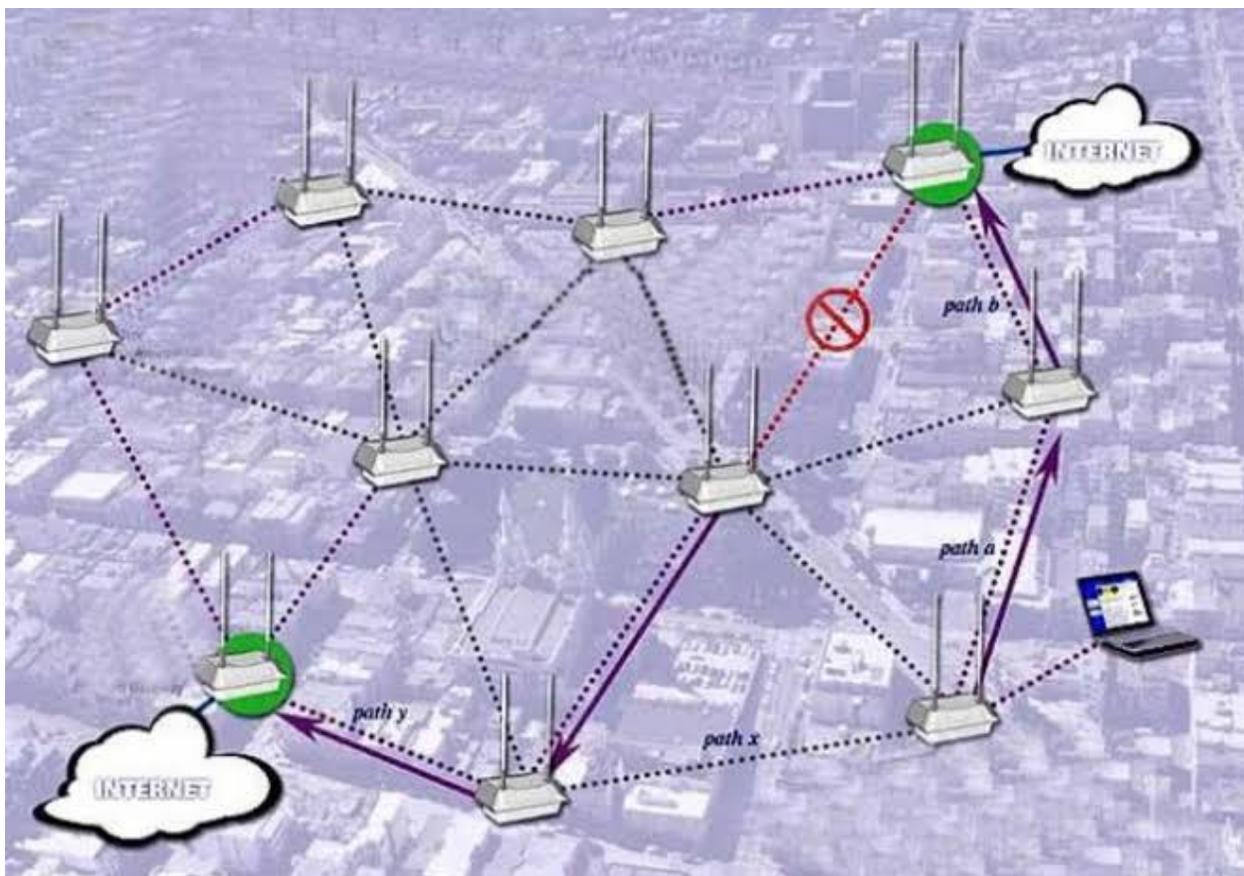
A hybrid topology is a type of network topology that uses two or more differing network topologies. These topologies can include a mix of bus topology, mesh topology, ring topology, star topology, and tree topology



Complexity of Design: One of the biggest drawback of hybrid topology is its design. Its not easy to design this type of architecture and its a tough job for designers. Configuration and installation process needs to be very efficient. 2) Costly Hub: The hubs used to connect two distinct networks, are very expensive.

6- Extension/redistributing

Central controlling unit of other community Networks in the area, like in bosco Uganda



(4) STARTING A COMMUNITY NETWORKS

Needs assessment:- why do you need Community Networks

Install your first node

Some groups never get around to installing anything. Just go and install your first node to prove

you can. Set up a public access point in a cafe or other meeting place, or just turn on your guest

network on your home router. Leave the router open and set the SSID to “-Our Name-” (the first

dash means it will be at the top of the list of SSIDs). With each successful install you get

experience, publicity and more members joining.

Ok, now you have a community-owned network and you can move onto the next steps-

Research

It is important to do some research and copy other success stories.

I have a video to show you about success of Pamoja Net community network on how they setup their own community

Choose appropriate antennas, routers and firmware

NYC Mesh is a hybrid network of point-to-point, point-to-multipoint (sector antennas), ethernet

and mesh. It is important to pick the right solution for each networking problem.

Don't pick one

method or protocol and try to make that work for everything (avoid tech-solutionism). Use off the-shelf hardware as much as possible.

For antennas you need higher gain (db) to go long distances. A 19db NanoBeam will go 1km, a

23db LiteBeam will go 3km, and a 33db/38db AirFiber will go 10km.

Generally for radios, the higher the frequency the faster the connection and the more it is

susceptible to weather and objects. Double the frequency and you double the potential data

rate. 5GHz wifi is roughly twice as fast as 2.4GHz wifi, but 2.4GHz has better coverage for home

wifi as it will go through the internal walls.

-900MHz (Lorawan) will go through a building, very slow speeds

-2.4GHz (WiFi) will pass through a wall

-5GHz works fine in the rain, but speeds are generally less than 500Mbps.

-24 GHz (AF24) is gigabit (1000Mbps) but will fail in heavy rain for distances over 4km.

-60GHz is inexpensive gigabit but will not go more than 500m in the rain.

Point-to-point

long distance (3 to 10km) We use AirFiber AF24 or AF5XHD

medium distance (up to 3km) LiteBeamAC is a very inexpensive way to get over 150 Mbps

short distance (< 1km) [Wireless Wire dish](#) -cheap gigabit connection. These fail in heavy

rain when the distance is over 0.5 km

Point-to-multipoint

Sector antennas are good for getting high-bandwidth into neighborhoods. Put one or more of these on a tall building. You don't need to flash these with mesh software, just use the factory software such as AirMax, usually set in "bridge" mode.

LiteAP -very good value!

PrismStation -very good for noisy environments

Multipoint-to-multipoint (mesh)

Mesh may use different firmware from the factory firmware or different configurations. It is

good for the last mile as it re-configures automatically. If there is a mesh network on your block,

often you can use just one device to extend the network.

For mesh protocols we are currently using OSPF in a MikroTik Omnitik. We have our own [config](#)

[generator](#) for this to make it simple. We have used BATMAN protocols such as bmx6 or batmanadv

(bmx7 is still experimental). There are prebuilt packages- Libremesh, qMp and Gluon. We

have used [qMp](#). Don't try creating your own, just modify an existing package to your

configuration. [Libremesh](#) has been very active lately and has support for a large range of

routers. We are currently trying this as well.

Commons license

The [commons license](#) is important as it has the rules to help the network sustain and expand.

The basic idea is that anyone can join the network but they also must agree to not harm the

network and also to extend the network by letting other people join their node. It has a similar function to the GNU GPL license for open source software, where you are free to use the software but must share the changes you make to the code.

The basic tenets are:

Participants are free to use the network for any purpose that does not limit the freedom of others to do the same.

Participants are free to know how the network and its components function.

Participants are free to offer and accept services on the network on their own terms.

By joining the free network, you agree to extend the network to others under the same conditions.

As the network grows, people may want to build businesses around the network.

This is

generally a good thing as the businesses will need the network to be stable and will help in doing this.

(5)WHAT FACILITIES/INFRASTRUCTURES DO YOU NEED

1- telecommunications equipment

Telecommunication equipment is any hardware used for telecommunication purposes. It includes a wide range of communication technologies – from transmission lines and communication satellites to radios and answering machines. Examples of telecommunications equipment include switches, telecom towers, fiber-optic cables, routers, voice over internet protocol (VoIP), and smartphones.



2- Electricity supply

In the context of energy, supply is the process of bringing energy from the point of creation, such as a power plant, all the way to the point of consumption at a home or business,

Community networks require electricity power.



3- Routing and cabling



4- Staffing

Staffing is the process of hiring eligible candidates in the organization or company for specific positions



5- License

A license is an official document which gives you permission to do, use, or own something,



(6) What regulatory conditions do you meet

There is regulatory conditions that you have to meet before starting community network, and this conditions will be permitted from government through Nigerian Communication Commission (NCC)



Consistent with Section 70 of the Nigerian Communications Act 2003 (NCA 2003), the Commission is empowered to make and publish regulations on matters such as, but not limited to; written authorizations, permits, assignments and licences granted or issued under the NCA 2003

The license are

- ❖ License to transmit radio wave
- ❖ Using libre router as your mode of connection
- ❖ Planting of network base tower
- ❖ Voice call regulations
- ❖ Others, follow this link to learn more about community networks licences
<https://www.ncc.gov.ng/licensing-regulation/legal/regulations>

(7)linking the community

a. How is service distributed to the community?

One-point access?

A type of network that point to a specific area or place, the network only working in that place.

Multiple point access?

Another type of network that will be seen by multiple and have distance radio frequency.

Wireless access?

An **access point** is a device that creates a **wireless** local area network, or WLAN, usually in an office or large building. An **access point** connects to a wired **router**, switch, or hub via an Ethernet cable, and projects a Wi-Fi signal to a designated area.

Cabled access?

A type of network connection that requires physical or hardware objects to be connected like cables, modem and others networking gadgets.

(8)Linking the community to the outside world

Peer-to –peer gate way

In its simplest form, a **peer-to-peer (P2P) network** is created when two or more PCs are connected and share resources without going through a separate server computer. A **P2P network** can be an special

connection—a couple of computers connected via a Universal Serial Bus to transfer files.

A good example of peer-to-peer network is cloud computers

Key advantages of a P2P network

Advantages

Easy file sharing: An advanced **P2P network** can share files quickly over large distances. Reduced costs: There is no need to invest in a separate computer for a server when setting up a **P2P network**.

Adaptability: **P2P network** extends to include new clients easily.

CN to commercial networks

In other cases, community networks are built in areas with existing commercial networks as an affordable alternative to traditional service providers. Community networks could also serve as autonomous or semi-autonomous backup systems in case there are disruptions in the available commercial networks.

(9)SUSTAINABILTY ISSUES

Service cost structure

A wireless network covering most of the community is a key component. Although the community networks offers many benefits, a key issue is the costs associated with laying out the infrastructure and services, making the bandwidth available and maintaining the services. Indeed, many community wireless networks have been successful. Could the rural inspire and assist the communities with building their wireless networks, and then unite them for a city-wide wireless network? We address the first question by presenting a model where municipality, communities and smart utility providers work together to create a platform, smart community wireless platform, for a community where platform sides work together toward achieving smart community objectives. One challenge is to estimate the total cost, benefits and drawbacks of such platforms. Another challenge is to model risks and mitigation plans for their success. We examine relevant dynamics in measuring the total cost, benefits, drawbacks and risks of smart community wireless platforms and develop models for estimating their success under various scenarios. To develop models,

Cost recover strategy

Adding more services and skills, will recover most of community network expenses

Subsidy

subsidy is a benefit given to an individual, business, or institution, usually by the government or other organizations with interest to promote the community networks. It is usually in the form of a cash payment or a tax reduction.

you can recover some cost from grant by relevant organization that support community networks.

Thank you