WE MEAN BUSINESS

Our Infrastructure Solutions aim at deploying highly scalable, networking solutions to the enterprise in time and within budget. From building LANs and WANs to getting up and going, we deliver a comprehensive suite of enterprise infrastructure.

Although technology is the enabler of the future for humans who choose to embrace the new digital enabled world, it will change the way we live and interact forever, this may be extremely exciting but at the same time very daunting.

PPIS
SOLUTIONS

1. INTRODUCTION STATEMENT

We take this opportunity to express our interest to be considered as your working partner in the field of structured cabling (Voice, Data & video – [CCTV]) in your projects. We are an ICT infrastructure design and implementing company with a wide experience in installation, troubleshooting and maintenance of strutured cabling and core networks (LAN, SAN, WAN, WLAN, VPN, video conferencing and IP telephony) and installation widely used Hybrid & IP PBX's. We are currently supporting and have upgraded LAN in various institutions to meet the current ICT and near future demands. We are confident that given an opportunity, we can prove our capability in creating a stable, scalable, available and reliable unified communication infrastructure in all the projects in addition shall provide much needed advice where needed.

We look forward serving your organization.
Yours Faithfully,

James Gicharu
Business Development Director
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2.0 OUR EXPERIENCE & RELEVANCE

It is with great pleasure that PPIS solutions presents this proposal for Expression of Interest for consideration as a working partner for Supply, Installation & Commissioning of structured cabling (Voice, Data, and Video), Network Equipment, IP Telephony and Telephone Accessories to your institution. This is in addition to installing clean and stable power for ICT equipments. Our relevance and experience is outlined in this methodology which reflects our understandings based on our experience on new structured cabling installation, upgrade or repair and maintenance of ICT infrastructure in various institutions and projected outcome once either of the service is completed. From our experience it is the desire of the clients to install a fully integrated network that manages Voice system, Data, Surveillance system (CCTV), Access Control (where applicable) and video conferencing all running on the same infrastructure. The network must be reliable, scalable, available, secure and expandable and providing sufficient bandwidth and redundancy. Where CCTV, Access control system are installed, data captured should be digitized and archived in a central storage server, located at the Operation Control Center (OCC). We base the entire infrastructure on a Gigabit speed (CAT 6 or 6A) and a gigabit switching (10/100/1000 Mbps) LAN in order to manage high bandwidth for voice/data/video transmission. In addition ICT active equipment need to be supported by clean, balance and stable power from UPS or inverters. Raw power is usually unstable and is harmful to active devices and reduces the life span and reliability of information gathered.

2.1 OUR BACKGROUND

PPIS solutions is a Voice/ Data and video networking Services Company based in Kenya with dedicated expertise and experience. As a key player in the voice and data communications market in East Africa the Company can anticipate its customers' needs, from corporate, small, medium enterprises to large enterprise businesses. Founded in 2016 the Company plans to establish herself as a service – centric organization addressing Voice / Data and CCTV service needs of the business community and corporate enterprise in Eastern Africa. As a role model for young entrepreneurs in East Africa, the Company aim is to facilitate professional growth based on sound values and uncompromising integrity. PPIS solutions strength lies in bringing together and building charged teams of high potential-high performing people. Through a leadership vision and pragmatism PPIS solutions is driven by the desire to become the most competitive and successful IT companies in East Africa.

3.0 METHODOLOGY FOR PROJECT IMPLEMENTATION

3.1 UNDERSTANDING OF REQUIREMENT

Based on our past experience in ICT infrastructure design and implementation, all institution look for a network that is reliable, neat, scalable, available, and secure that can provide support for the standard and IP based technology.

Solution is envisaged to involve the following parameters:
•Design, Install, configure and commission a IP based gigabit LAN / WAN network that is available, secure , neat, reliable, and scalable easy to understand and support.
•Implement ICT infrastructure that will be the foundation of any other ICT expansion setting e.g. video conference, WAN for the entire branch or country network.
•Establish a reliable and automatic fall back links for the LAN - (Across the across all the inter-block linkages.
•Train support staff for the LAN support
•Provide " as – is built " drawings, test result and warranty certificate

3.2 PROJECT AIMS

At the end of the project PPIS solutions will have delivered an infrastructure that is easy to understand, support and expand. Some of our deliverables will be and not limited to:

•Establish permanent pathways for ICT infrastructure and clean power.
•Install a reliable , neat, available , scalable structured cabling network based on current technology.
•The infrastructure should support the current and future demand.
•Design and install a modular based ICT infrastructure that will reduce cable redundancy and maximize on data integrity.
•Establish permanent data pathway for all ICT cabling within the buildings and blocks.
•Provide a schematic diagram for the new structured cabling LAN/WAN.
•Install clean and stable power for the ICT equipment.

4.0 GENERAL APPROACH TO STRUCTURED CABLING

When implementing integrated network, a modular approach is necessary This means that one should break the design into different sections, which can then be replicated as needed, using a recursive model. One needs to co sider several functional entities which include ICT accessibility, server and other resources availability. Every network entity will be complete by itself. This approach will enable the LAN/WAN has many benefits some of which are as follows:

•Availability
- Reduces failure domains
- Enhances redundancy
•Manageability
- The network can be configured by group
- Easier troubleshooting
- Minimum impact to entire network from individual changes
- Effective policy implementation, e.g. security, traffic prioritization
•Scalability
- Easier to replicate, change and expand. A three-layered network Architeture is commonly used and has proven to be effective.

The three layers are:
a) **Core Layer** This layer provides very high speed transport to distributio layers and ensures reliable delivery of data packets. It is the backbone of the network.
b) **Distribution Layer** This layer provides transport between access and core layers. More network transmission control is implemented at this layer, like VLAN, filtering. Redundancy and routing are implemented too.
c) **Access (Edge)** Layer End nodes such as network devices and workstations are connected to this layer. Switching functions are implemented along with administrative policy, such as security, traffic prioritization.

4.1 NETWORK REDUNDANCY

Network redundancy is a simple concept to understand. If you have a single point of failure and it fails you, then you have nothing to rely on. If you put in a secondary (or tertiary) method of access, then when the main connection goes down, you will have a way to connect to resources and keep the business operational. One needs to consider several functional entities here, including user access, aggregation, core and server access.

•**User Access Layer**- port switched user access. Normally this layer covers the
Wiring closet.

•**Aggregation Layer**- aggregation of many user access or wiring closet (WC)
Switches, this layer is often also called distribution layer, since it involves distribution to the floor/wiring closets.

•**Core**- interconnection between different aggregation points and server farms.

•**Server Access Layer**- server farm connectivity, resource layer.

4.2 NETWORK ACHITECTURE (GIGABIT SWITCHING)

Most architectures use the CISCO/D-Link as a Layer 3 switch to route traffic from the client and server to the Desktop computers. Occasionally, you may need to implement Layer 4-7 services and applications using the CISCO/D Link as a Layer 2 switch, however. Such occasions arise if you are aggregating optical Ethernet connections via the CISCO/D-Link I/O modules. The sample architecture in the figure below shows traffic entering through a CISCO/D Link I/O module and traversing the backplane at Layer 2 to the Desktop computers.

In this example, client requests are coming from the Internet using an uplink router connected to the WSM front-facing port server farm. In turn, this server farm is connected to the CISCO/D-Link I/O module. VLAN 1 is crea ed in the CISCO/D-Link and BFM ports 3 and 4 (WSM dynamic MLT) are assigned to VLAN 1. An IP address is then assigned to VLAN 1 in the WSM consisting of Ports 7 and 8. The servers can point to the IP interface in the WSM as their default gateway. The CISCO/D-Link is providing a Layer 2 switching path here for the servers connected to the I/O module.

4.1 CABLING TOPOLOGY

The structured cabling will be based on star topology. The star network features individual point-to-point cable runs radiating from a central data center, which house a cores and horizontal switches in data networks. The advantage of a star network is that one can connect and disconnect equipment without disrupting the rest of the network. The star network facilitates smooth moves, adds, and changes. It also enables installing networks in a modular way that is easy to understand, reliable, scalable and efficient.

4.2 CABLING

Cabling is one of the most important components of the network and is the most long-lived with an expected life span of 15 – 20 years. An institution will upgrade its servers, switches, and computers several times before an upgrade of the cabling is done. It is critical at this time to purchase reliable, cables that can withstand change in technology for such duration of time.

During cabling we shall consider the following from procuring cable and their accessories to installation.

•Horizontal Cabling
- Horizontal Cross-connect (HC)
- Horizontal Cables
- Transition point(Option)
- Consolidation Point (optional)
- Telecommunication-Outlet / Connector (TO)

•Backbone cabling
- Main Cross-connect (MC)
- Inter-building backbone cable
- Intermediate Cross-connect (IC)
- Intra-building Backbone Cables

•Work Area (WA)
•Telecommunication Closet (TC)
•Data Center (Equipment Room (ER))
•Entrance Facility (EF)
•Administration

5.0 GENERAL NETWORK PROPOSAL OUTLINE

PPIS Solutions proposes a "High Availability" LAN/WAN (MAN) solution from industry leaders like CISCO/AVAYA/D-Link switches with quality cables such as siemon / giganet. The solution proposes high reliability, available and scalable ,,Ethernet Routing Switch with 24 or 48 10/100/1000 ports to the CCTV cameras, Desktop as the LAN edge switches, supported by high qual ty cabling that will maintain a Giga speed throughout the entire network. Cables will run through metal trunking pathways that are permanent, with horizontal cables being High Quality, High speed copper wire with 4 pair c bles. Backbone cable will be fiber optic that can support up to 10GB/s , which will interlink the core switch network and the horizontal switch network. The fiber optic cable will be armored 8 core fiber.

The 3 M and 1 M patch cord will be CAT 6 factory made while the teleco munication outlets will be keystone RJ45 CAT 6 outlets and will be siemon products.

5.1 METAL TRUNKING

For a long lasting, neat and scalable network, use of metal trunking is advisable. Since the trunking will carry power, data, voice and CCTV cables, we do recommend at least mixture of 300mmx 50 mm, 200mm x 50 mm and 150mm x 50mm and 100mm x 50mm depending on the current sitting and expected growth in the room and surrounding offices and the trunking must be twin compartment unless stated otherwise. In this example, client requests are coming from the Internet using an uplink router connected to the WSM front-facing port server farm. In turn, this server farm is connected to the CISCO/D-Link I/O module. VLAN 1 is crea ed in the CISCO/D-Link and BFM ports 3 and 4 (WSM dynamic MLT) are assigned to VLAN 1. An IP address is then assigned to VLAN 1 in the WSM consisting of Ports 7 and 8. The servers can point to the IP interface in the WSM as their default gateway. The CISCO/D-Link is providing a Layer 2 switching path here for the servers connected to the I/O module.
All cable will run inside a two chamber compartment metal trunking. The trunking will be big enough to accommodate current and future cabling expansion. They should provide a lifelong support. The trunking will be installed in a way that we maintain the beauty of the building aesthetics and run along the topology of the building.

5.2 CABLES

Structured cabling is the foundation of a successful Intelligent Building Network and the basic investment on which all other network equipment depends. Emerging bandwidth-intensive applications - like voice over IP, IP based videoconferencing and digital audio and video - are becoming reality. Businesses expect their information technology (IT) investment to impact heir bottom line; to increase sales, decrease operational costs and improve product quality. Now, more than ever, information plays a vital role. The successful delivery of that information within and across enterprises - s an absolute necessity. To that end, a reliable, high-performance IT cabling foundation is key.
In this regards, we propose **SIEMON/GIGANET** Category 6 Structured Cabling System to be used as horizontal and backbone cable.

5.3 MODULAR SEGMENTATION OF LAN

The standard length of data transmission within CAT 6 is 100M. We shall limit the maximum distance of cable coverage from the distribution point to the workstation to 80 Meters. From that position a fiber will be linked from the data center to the distribution point.

5.4 HORIZONTAL CABLING

The horizontal cabling system encompasses everything between the data center room or a distribution point cross-connects to the telecommunications outlets in the work area. All the cable typically runs horizontally above the ceiling, along the wall or below the floor from the data center or distribution point on the same floor.
After installation of structured cabling, the horizontal cabling system is subject to most activity in terms of users, re-locations, changes in building layouts, and more. To change the horizontal cabling after installation can be very expensive, time-consuming, and disruptive. During implementation PPIS solutions will Plan carefully the pathways because the horizontal cabling is extremely important to the design and effectiveness of CLIENT cabling system.

As part of our cabling practice; we will follow the following guidelines as stipulated in cabling internationally recognized standards:
•The horizontal system shall (remember that "shall" means required) beinstalled in astar topology.
•All cables shall be installed in a workman-like manner, parallel to walls, floors and ceilings, as applicable. No distortion due to kinks, sharp bends or excessive hauling tension shall be allowed to occur during installation.
•Care shall be taken to prevent people damaging the cable by walking or storing heavy objects on them whilst lying out and installation. Cables will be run in a manner eliminating any possibility of strain on the cable itself or on the terminations.
•Cables entering or exiting trays, conduits, catenary wires and other fixed support shall have a small gooseneck or slack provided and shall be fixed at both ends to prevent the possibility of cable stress. Cables shall be concealed except where nominated otherwise, and shall run in neat lines.
•Cables shall have no joints or splices. Cables shall be kept at a minimum distance of 150mm from items liable to become hot or cold. The distance shall be consistent with the maximum or minimum temperature possible.
•Cables shall at no point make direct contact with such items. Cables shall not be embedded in plaster, concrete, mortar or other finishes unless they are in conduit and capable of being fully withdrawn and replaced after the building is finished without damage to finishes.
•The total length of the horizontal cabling subsystem must not exceed 90m and the total length of the patch cordage must not exceed 10m. The total combined end-to end length must not exceed 80m though recommended length is 100m and must contain no more than two connectors. I.S. forbids the use of Consolidation Points (CPs) or any form of joint.
•In case of any length beyond 80 meters, a Cabinet will be installed as adistribution point to the remaining points and will be linked to the primary distribution point of that floor by a fiber cable.

5.5 OPEN OFFICE CABLING

Horizontal cabling methodologies are specified for "Open-Office" enviro ments by means of multi-users telecommunications outlets assemblies and consolidation points. These methodologies are intended to provide increased flexibility and economy for installation with open office work spaces that require frequent configuration.

EQUIPMENT ROOM

This should be a centralized space for telecommunication equipment that serves specific occupants of the building. Equipment room can also add up as an entrance facility. Some of the considerations when identifying these locations are:

•Site location should allow for expansion
•Accessibility to deliver of large equipment
•Not located below water levels
•Away from sources of EMI
•Safeguard against excessive vibration
•Sizing should include projected future as well as present requirements.
•Equipment not related to the support of the equipment room should not be installed in , pass through or enter the equipment room.

ENTRANCE FACILITY

The entrance facility consist of the telecommunications services entrance to the building and backbone pathways between buildings. Some of the considerations for deciding for the entrance facilities locations are:

•Providers of all the telecommunication services shall establish positions. They includes ISP, Telecommunications companies, etc.
•Location for other utilities (eg Power, Water) shall be considered in locating the entrance facility.
•Alternative entrance facility will be requested for where security, continuity or other special needs exist.
•Equipment not related to the support of entrance facility should not be installed
in, pass through , or enter the telecommunications entrance facility.
•Dry location not subject to flooding and close as practicable to the entrance point and electrical service room will be a good choice.

FIBRE CABLING

Fiber cable will be used to link the Main Distribution Area (Core switches) with all the horizontal distribution Switches per floor. An armored Multimode fiber cable will be used. Floors that have horizontal distance more that 100M, two cabinets will be installed to link the two horizontal distribution cabinets. A CAT 6 or a fiber link will be used as a backbone cable which will be in a pos tion to transmit data at 10GB/s instead of a fiber cable to Link the two cabinets

6.0 POWER CABLING

Every data point must have a power outlet. Mitambo Tech services Ltd has a department that specializes in installation of clean to the ICT equipments. The items of considerations are:

•Source of raw power – Main MCB distribution Point

•Location of ICT power sub distribution with its own power distribution (MCB)

•Maximum number of ICT Equipment per circuit breaker in order to balance the power

and avoid overload.

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in, pass through , or enter the telecommunications entrance facility.

•Dry location not subject to flooding and close as practicable to the entrance point and electrical service room will be a good choice.

DATA CENTER/SERVER ROOM CABLING

Data centers seldom meet the operational and capacity requirements of their initial designs. The principal goals in data center design are flexibility and sca ability, which involve site location, building selection, floor layout, electrical system design, mechanical design and modularity. Data center houses a large number of diverse bandwidth-intensive devices, including bladed servers, clustered storage systems, virtualization appliances, and backup devices – all interconnected by networking equipment. These devices require physical cabling with an increasing demand for higher performance and flexibility, all of which require a scalable, and manageable cabling infrastructure. In this regard PPIS solutions will use a structured approach in cabling the data center and linking various horizontal distribution points with fiber cable.

6.0 SERVER ROOM CONSTRUCTION METHODOLOGY

A data center (or Server Room) is an enclosed space for housing all the active and passive devices used in a LAN/WAN, cable terminations, and cross-connect cabling. The design and location of server room is very often a last minute thought, resulting in equipment room being housed in inadequate, unventilated, overpopulated spaces, without allowing room for future expansion. To avoid this, we propose the architect, electrical/data consultant, main contractor, sub-contractor, supplier, installer, or anyone responsible for the specifying of the Telecommunications Rooms should seek advice from the Network Installation Project Manager as early as possible.
Correct specification of data center Rooms is vital during the preliminary architectural design phase of a project and will ease the implementation and operation of both the cabling and the applications supported. To ensure smooth transition from installation to operation, data center require detailed specification in terms of location, space and environmental aspects.

It should provide all the facilities for passive components, active devices, and external network interfaces housed within it and should have direct access to the Backbone Cabling System both internal and external.

Some of the factors that should be put in considerations while designing the data center are:
•Number of Communications Cabinets
•Power supply to the data enter
•Uninterruptible Power Supply (UPS) and back-up generator installation.
•Ventilation/Air Conditioning/Cooling
•Data center Lighting
•Raised Floor installation
•Security and access control to the server room
•Doors to the Equipment Room should be self closing and swipe Card Access should be
considered essential in an Equipment Room.
•Surface Finishes: Air-borne dust levels must be carefully controlled.
•Not near the entrance facilities of utility like water.

6.1 HORIZONTAL CABLE MANAGERS (CABINET LEVEL)

Horizontal cable managers allow neat and proper routing of the patch cables from equipment in the racks and protect cables from damage. 1 U horizontal cable manager will be used and they will be of brush type. During network support, the support team will keep on opening and closing the metal cable managers and as time goes, the metal manager slowly eat the patch cords and make them useless. Use brush cable manager is advised because it solves the problems related with metal cable managers.

USING CABLE TIES

Groups of cables will be tied together using cable ties. Cables shall be grouped depending on the wings they are originating from for overall cable management.

6.2 VERTICAL CABLE MANAGERS (CABINET LEVEL)

Along the rack, we shall us d-rings type of cable managers to support cables along the rack sides or design a vertical cable manager behind the rack which does not block. access to components in the space between the racks.

USING COLOR TO IDENTIFY CABLES

Color provides quick visual identification. Color coding simplifies management and can save you hours when you need to trace cables.
Varies patch cords color can represent various items. For example: Color blue can represent all the network printers, Color Red can represents all the cascading cables etc.

TESTING THE LINKS

Cables will be tested during installation and after termination to be sure that no cable has a problem. Testing of "alien crosstalk" will be done and if found to exist it should be minimized or be eliminated.

7.0 DOCUMENTATION

The most critical task in cabling is documentation of the entire infrastructure: including diagrams, cable types, patching information and cable counts we shall provide a complete documentation both inform of a HARD COPY and a SOFT COPY in a CD.

TESTING

The tests will comprise a thorough inspection of the entire Installation, and performance tests specified are necessary to confirm compliance with the manufacturer's specification and client expectation. PPIS solutions shall provide necessary skilled and competent personnel together with all equipment required to test and commission the works. The installation shall be tested progressively as installation progresses and then finally on completion to ensure that the installation complies with the specification and operates correctly under normal circumstances.

All testing and commissioning shall be carefully pre-planned and scheduled, in order that, it is fully coordinated between PPIS solutions engineers client ICT Department and shall be carried out in a safe and efficient manner with a minimum of inconvenience to all concerned.

- The CLIENT in conjunction with PPIS solutions engineers shall set a schedule acceptance for testing at their earliest convenience time.
- A CLIENT representative shall be present during testing.
- Such acceptance testing shall in no way reduce the Contractors' obligations regarding restoration, clean up or warranty.
- PPIS solutions shall perform tests necessary to ensure that the installed cables will pass acceptance testing performed in conjunction CLIENT representatives.
- PPIS solutions shall be responsible for performing, tracking, and recording the results of tests.
- PPIS solutions shall be responsible for providing equipment and materials necessary for as long a period of time as necessary to complete testing
to the satisfaction of the CLIENT.
- Test record forms shall be agreed to by the CLIENT prior to the commencement of acceptance testing.

TRAINING

We shall conduct a detailed training for the CLIENT team that will be involved in daily management of the LAN/MAN. The will include general tro bleshooting techniques, problems isolation and identification.

SUMMARY

Although cabling represents a small percentage of data center network investments, it will outlive most of the active device; it is the most difficult and potentially costly component to replace. When choose the cabling infrastru ture we are considering the full lifecycle and the industry trends to arrive at the right decisions for the cables to use. In addition, we understand that strong foundation supporting current and future network technologies need to comply with TIA/ISO cabling standards. The cabling itself calls for the right knowledge, right tools, patience, a structured approach and most of all disc pline. Without discipline it is common-sense to see a complex cabling "masterpiece" quickly get out of control, leading to chaos and confusion.

CONCLUSION

From our experience, a well designed, properly documented and modularly installed LAN / WAN offers a 99% problem free and down time is almost negligible. We are confident that given an opportunity, we can deliver the v sion of Department of Defense ICT strategy both within the head office and satellite offices.