TIP Community Lab License Criteria

This exhibit outlines what constitutes TIP Community Lab @xyz from process, space and technical perspective. It is foreseen that multiple TIP CL will exist in different parts of the world.   This section outlines what constitutes TIP CL. The trademarks TIP CL, TIP COMMUNITY LAB, AND TIP COMMUNIYT LAB @xyz, may only used by environments that meet the below described criteria.

TIP Community Lab Overview

TIP Community Labs are a supporting function for the TIP initiative, sponsored by TIP members to provide a physical space for open innovation on telecom infrastructure solutions. While the community labs are dedicated to TIP projects and host TIP project teams, the space and basic equipment is sponsored by individual TIP members hosting the lab space.

The TIP Community Lab @xyz (TIP CL) will provide a collaborative working environment for project groups to test new proof of concept or technologies solutions that are designed to address specific service provider use cases. One of the main goals of TIP CL is to accelerate speed of innovation with clear path to scalable deployment. Projects that successfully implement and integrate reference implementations and solutions in the Lab will serve as starting point for commercialization. The role of the TIP CL lab is to enable project teams to create solutions by integration of existing and newly developed components and products.

TIP CL should be considered as a tool and environment that TIP project groups can leverage to accelerate their community based collaboration.   TIP Community Lab is a resource for TIP projects and project chairs. TIP CL can be used as collaboration space for a proof of concept (POC) or a reference implementation, or other types of collaboration.

TIP CL is providing an open collaboration environment for TIP members to focus on an impactful result defined in the project groups charter. TIP CL is different from other types of labs since it also promotes a certain collaboration culture with in the environment.

Below is a list of the main philosophy that participant should adhere to.

Be Open - Promote a culture of conversation and communication. Be open to other's perspective and allow healthy debates.

Hacker Mentality – Go beyond the status quo and creatively search for new solutions

Fail Fast – Prototype quickly to test hypothesis and if failed, apply learning to next iteration

Blameless Failure – Assume positive intent from all participants and never attach blame to people. Allow engineers freedom to explore ideas and design options

While TIP CL promotes openness between parties with in project groups it should be designed for collaboration while still protecting each project groups IP.

TIP CL Community

The various TIP community labs are forming a community, sharing best practices, infrastructure blueprints, processes, forms and experiences with each other. The leanings and experiences might also be shared outside the TIP CL community, helping organizations and initiatives collaborating with TIP to establish spaces where open innovation on new technologies happens.

TIP CL should also act as a hub for TIP to engage with the community in generating new ideas and projects. Example of such programs are:

- Hackathons
- Speaker sessions
- Community events

It is expected that different service or solution providers and TIP members would create a TIP CL locally in their region. It is also possible that different TIP CL might focus on different areas TIP community is engaged in such as access, core or backhaul. To ensure the best support for the project group, we expect different TIP CLs to focus on different technologies and this way see individual TIP CLs evolving into competence centers for specific technology types.

To act as a single HUB for the TIP community different TIP CL will be engaged in a bi-monthly call just to coordinate efforts and help share knowledge. It is also expected that each TIP CL will have capability to easily connect to the other TIP CL creating one global lab in case different HW or SW components from each lab needs to communicate with each other for a project.

TIP CL operates based on open collaboration and activities are shared back into projects groups. It is important that there is a logical separation between service providers' own internal lab and hosted TIP CL. The TIP CL environment should be presented as a TIP resource and allow any TIP member access, including other service providers, if they are part of project group being hosted in the TIP CL.
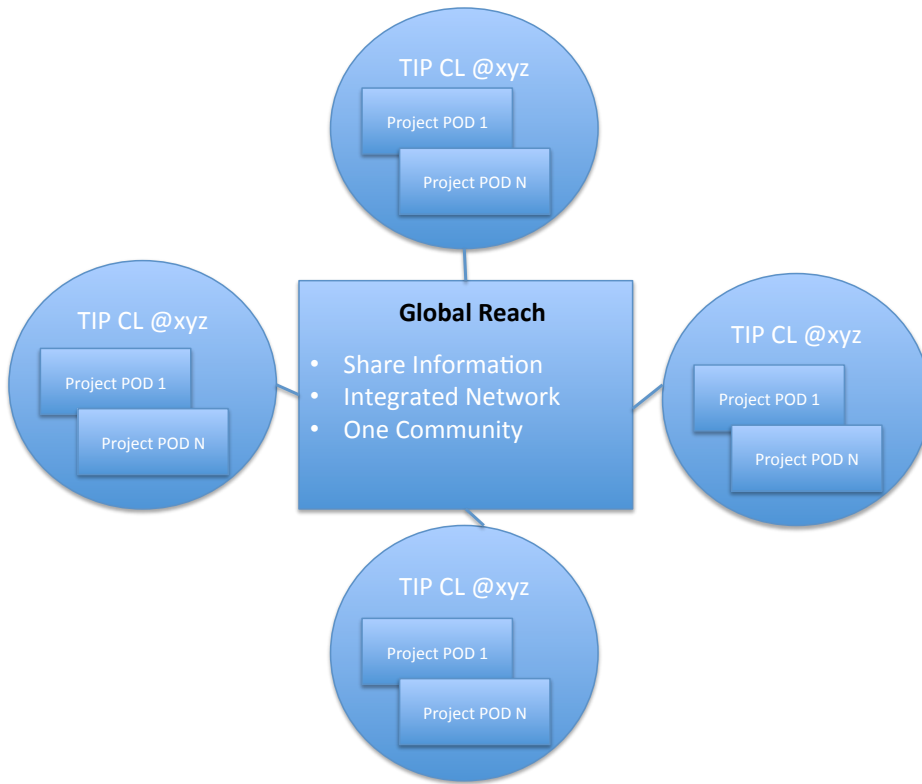
Figure 1- Global reach with multiple TIP CL

TIP Community Lab Legal Framework

The legal framework around TIP CL should point to TIP legal framework and TIP project group IP policy. If a community lab participant desires to make certain of its technology available to other TIP members for use in the community lab for testing and evaluation purposes, such participant may execute a TIP Community Evaluation License in a form provided by TIP. Otherwise, there should not be any new legal framework for the collaboration efforts in the lab. The goal is to make it as easy as possible for TIP members to be able to use TIP CL resources.

The lab space provider will enter into a participation agreement with the participants in the lab which will have standard terms supplied by TIP.The participation agreement should also clearly state what items are contributed to TIP and what items are protected based on project groups' IP policy. In some instances, lab project might require funding. These cases will need to be addressed as special cases and handled as a one off through TIP board and TIP Technical Committee.

TIP Community Lab Space

TIP CL space is designed to create a collaborative environment, but at the same time protect IPR concerns across projects. Flexibility in size configuration and management is also a goal in the design.

Every project will be assigned a project POD which is basically a closed area with badge accessible only to people engaged in that project. The project POD can have different sizes and be offered based on the collaboration size. Figure 2 below outlines a basic project POD. Each POD will have working benches and a connecting server room area which is separated by a door. These server rooms are cooled with in standard temperatures 62-70 degrees C. The POD's can include a RF shielded room for projects requiring over the air testing use cases. Every project POD is self-contained. If possible separating each POD's electrical circuit box will help protect and provide customer power as required per project.

TIP CL is a place where different companies will be onsite collaborating. Therefore, ease of access to TIP CL and specific area is very important. There should be some physical separation between TIP CL location and rest of the company's facilities in order to minimize any security risk. Some sort of badging access needs to be used to allow access in and out of the TIP CL without required escort by other company members.
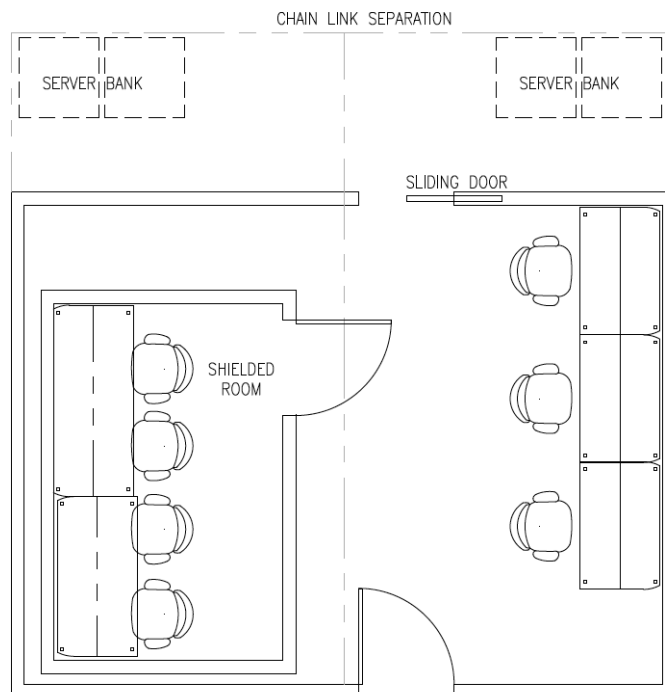
Figure 2- Project POD

The TIP CL space should also provide a common area where light collaboration can take place and allow project members to have a relaxed environment for general discussion or to rest.
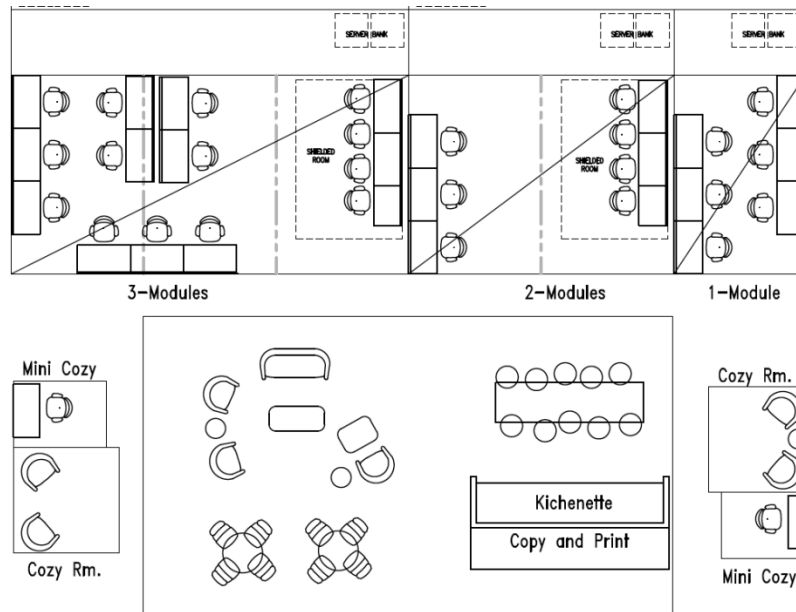

Figure 3- General layout of TIP CL (note different size POD modules)

If possible the TIP CL should also have an outside area where project that require physical outdoor installation such as Satellite, antennas, etc. can be mounted and used. The outside area should provide protection for equipment installed.

TIP Community Lab Network

TIP CL needs to have an open IP network to allow for access flexibility, but still manage the security risks. Each project is expected to have their own IP requirements and each project needs to be able to define their own subnet and network. Such an open network should support partner's remote access to certain HW for management and upgrade through VPN connectivity.

TIP CLs will host multiple projects and share resources while the physical and network setup shall ensure that access to project group specific components is limited to the project group

members. Technologies like access lists and VLANs that restrict the access are considered as secure, sharing of equipment in a secure way is encouraged to optimally use the resources provided by the host of the CL space.

TIP CLs basic infrastructure and the specialized infrastructure making it a competence center for a specific technology is provided by the hosting TIP member company. The investments in equipment will be controlled by the hosting TIP member and provide a state of the art environment while project groups can not expect the host to provide unlimited financial resources for equipment. Project group chairs are responsible to identify required equipment with the project group team and the potential TIP CLs hosting the project group. For equipment that cannot be provided by the hosting company the project group in agreement with the TIP CL host might provide additional equipment for the period of the project or beyond.

It is also strongly suggested that the TIP CL network is separated from company's network to provide more security and flexibility. A dedicated direct Internet circuit is recommended.

Figure 4 outlines sample network architecture. Note that each lab/project POD has its own subnet. It is responsibility of the lab network operation team to make sure there are no conflicts with each subnet. The VPN server can be used at a central point in the network and manage each lab or it can be distributed to each lab so VPN accounts can be managed by each project rather than centrally.
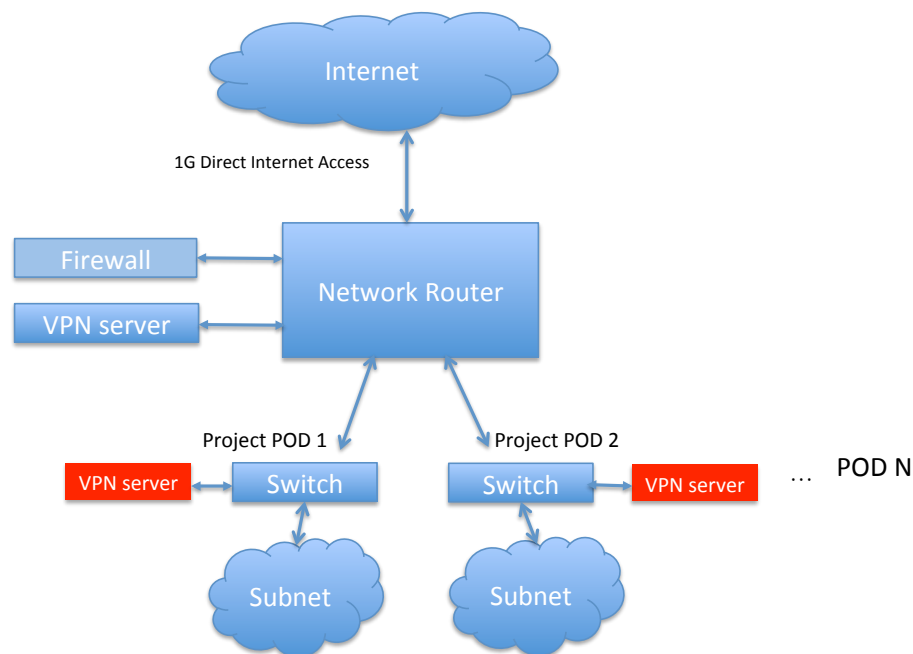

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Figure 4- Possible Network Architecture

TIP Community Lab Tools

The lab should provide on top of space and power certain equipment for each technology area. It is suggested to use as much open components as possible both in HW such as OCP framework and SW.

- General Lab:
    - Switches/routers
    - Cables (optical and copper)
    - Network adaptors
    - Power adaptors and convertors
    - Lab seat and benches
    - Laptops (wireshark, etc)
    - Standard Compute nodes (for compute nodes it is suggested to use Open Compute (OCP) framework)
    - Server Racks

TIP project groups have been categorized into three main areas Access, Core and Backhaul. Below is outline of some of the equipment used for each area.

- Access:
    - Spectrum Analyzer
    - RF UE load simulator
    - Programmable SIMs and SIM burner
    - RF shielding environment
    - IP Traffic generator
    - Test handsets
    - Test eNB software
    - Software device tools such as QXDM
- Core:
    - Traffic analyzer
    - IP Traffic generator
    - Test EPC software
- Backhaul:
    - Satellite capability
    - Fiber loop
    - Optical Switches and transvers
    - Optical WDM4 modules

TIP Community Lab Power

Unfortunately, devices and test equipment in telecom market area vary in their power requirement. TIP CL should have flexibility to allow different powers to either be available or easily added as needed. Typical power to be supported are -48v DC, 100-250v AC. The power system should support different amperage and multi-phase power systems. It should also be able to support different plug types from NEMA and IEC standards.

The lab should publish its power capability and if a project requires any customize setting it can be discussed before entering the lab. It is strongly suggested to have separate or dedicated power grid (fuse box) for each project POD.

Roles and Responsibilities

The TIP CL Host will fulfill its roles and responsibilities described in the TIP Community Lab Project Policies and Procedures ("**CL Project Policies**"), and will designate representatitives to serve as the TIP CL Lead and the TIP Technical Lead, as those roles are defined in the CL Project Policies.

Minimum Requirement

This exhibit outlines and suggest a minimum requirement from Criteria features to establish a TIP Community Lab @xyz.

- At least support two project Pods with minimum square footage per Pod being at least 300 square feet
- Provide a TIP CL technical lead
- Provide a TIP CL lead
- Provide general lab tools outlined in this document
- Equipment and tools support for at least one of the TIP main project categories (Access, Backhaul, Core)
- Open network that at least supports external VPN access to lab equipment's for remote debugging and access.
- Defined process for participant visiting and access to the TIP CL and any internal legal framework required