
Libre Space Foundation

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Libre Space Foundation

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Welcome to Libre Space Foundation documentation. In these pages you can find operational principles, definitions, processes and best practices for various internal workings of the Foundation.

1.1 Projects

1.1.1 Project Management

- *Overview*
- *Creation*
- *Kanban board*
 - *Open column*
 - *To Do column*
 - *Doing column*
 - *Done column*
 - *Closed column*
- *Retrospective*
 - *Rules*
 - *Process*

Overview

This is the recommended Mode of Operation for Libre Space Foundation projects. GitLab issues shall be used as the platform for the project management of LSF projects. Kanban board shall be utilized to facilitate the project management process.

Creation

For any new or existing project generally there is an associated Gitlab project. A new Gitlab project can be requested [here](#) using the “GitLab - Create project” template.

Kanban board

The Kanban board shall have the following columns:

- Open
- To Do
- Doing
- Done (optional)
- Closed

Kanban process is task oriented. So, all issues created shall involve a task or be expressed as tasks.

Open column

Once an issue is created, it goes in the Open column as a new card. Cards which remain in this column shall always be unassigned. The idea with this column is that people can have a quick visual indication on which issues are pending. No GitLab label shall be used for this column

To Do column

The backlog can grow quite large but the team has a maximum working capacity. The ‘To Do’ column is used to limit the pending work which can be overwhelming for the team. A set of cards is selected and moved to the ‘To Do’ column. These are the issues that the team shall focus on. Cards which remain in To Do state shall always be unassigned. The idea with this column is that people can have a quick visual indication on which pending issues to focus on. The set of issues in ready state shall be selected based on:

1. How ready are the issues to be worked on
2. If they all deliver a working feature
3. The future working capacity of the team.

The number of issues in this column shall be kept low and not more than the team can handle. A GitLab label shall be created for this column. The label shall have #F0AD4E as a background colour.

Doing column

People can assign themselves issues using this column. This shall be done by:

1. Pulling the card from ‘To Do’ to ‘Doing’ column and
2. Assigning the card to themselves.

Cards which remain in doing state shall always be assigned. The idea with this column is that people can have a quick visual indication on which issues are worked on. The number of issues in this column shall not exceed at any time the maximum working capacity of the team. A GitLab label shall be created for this column. The label shall have #5CB85C as a background colour.

Done column

Done column is optional. If used, completed tasks shall be moved in this column. Cards which remain in Done state shall always be assigned. It is mostly useful in projects where a regular status meeting takes place. During the meeting, completed tasks can be reviewed and closed. A GitLab label shall be created for this column. The label shall have #428BCA as a background colour.

Closed column

The Closed column is used for:

- Completed tasks, when Done column is not used.
- Canceled or superseded tasks.

Cards which remain in Done state shall be assigned when completed and unassigned when canceled. A GitLab label shall be created for this column. The label shall have #428BCA as a background colour.

Retrospective

The retrospective process is a method for teams to do self-inspection and continuously improve. Retrospectives meetings shall be executed regularly on all projects. The meeting shall result a concrete action plan towards improvement.

Rules

The retrospective meeting shall follow these rules:

1. A retrospective meeting shall be held once a month
2. A positive environment shall be created
3. The meeting shall focus on continuous improvement
4. Blaming people must be avoided
5. All opinions shall be listened

Process

The retrospective is a regular meeting. The meeting shall be scheduled when most people can attend, taking into account the distribution of people across different timezones. Although a physical meeting is ideal, an audio or realtime text meeting is also acceptable. The retrospective process steps are the following:

0. Invite the team to join the meeting
1. Discuss about what went well since the last meeting
2. Discuss about what lessons were learned
3. Make a plan and create actions needed for going forward

The actions shall create or update tasks in GitLab.

1.1.2 Projects Portfolio

- *Overview*
- *Currently active projects*
- *Previously active projects*
- *Contributors*

Overview

Libre Space Foundation develops and supports a variety of open-source projects for space. For each project there is a project manager and a project champion (more on those *Roles*).

Currently active projects

The following major projects are in active development:

Project	Project Manager	Project Champion
SatNOGS	Vasilis Tsiligiannis	Vasilis Tsiligiannis
tiny-ipfs	Manolis Surligas	George Tsagkarelis
SatNOGS-tiny	Manolis Surligas	
SIDLOC	Pierros Papadeas	Vasilis Tsiligiannis
QUBIK 3-6	Pierros Papadeas	Manthos Papamatthaiou
PICOBUS	Manthos Papamatthaiou	Manthos Papamatthaiou
SatNOGS COMMS	Pierros Papadeas	Pierros Papadeas
Communications	Eleftherios Kosmas	Nikoletta Triantafyllopoulou
Rocketry	Manthos Papamatthaiou	Ilias Daradimos
Infrastructure	Vasilis Tsiligiannis	Vasilis Tsiligiannis
Polaris	Xabi Crespo	Eleftherios Kosmas

Other projects can be found in lsf-core repository.

Previously active projects

The following major projects have previously been in active development:

Project	Project Manager	Project Champion
OpenSatCom	Pierros Papadeas	N/A
UPSat	Pierros Papadeas	N/A

Contributors

Libre Space Foundation is an active and welcoming community around open source space projects. We welcome all contributors in our projects and repositories. We recognize those contributors that have been making considerable contributions in our projects by inviting them in our “LSF Core Contributors” group. Learn more about *Core Contributors*.

1.1.3 Project Joining

- *Overview*
- *Governance*
- *Technical*
- *Legal*
- *Brand*
- *Press & Marketing*
- *How LSF assists*
- *Joining Process*

Overview

Thank you for your interest in joining Libre Space Foundation as a project.

This document provides a simple list of the LSF’s expectations of any Libre Space project, with pointers to the detailed policies or best practices. “Libre Space project” specifically means a top level project at the LSF.

1. Some things projects **MUST** do are requirements; failure to follow those will result in the board taking action to correct the issue.
2. There are many best practices that projects **SHOULD** do. Broad experience at the LSF shows these are proven methods that work well.
3. The LSF and some Libre Space projects have other suggestions and practices that projects **MAY** do.

Ultimately, Libre Space projects report to, and are responsible to, the Libre Space Foundation Board, which mandates these policies for the LSF as a whole.

Governance

1. Project decisions and direction **MUST** adhere to the Libre Space Manifesto.
2. Project technical decisions **MUST** be made and communicated on public and archived places.
3. Project discussions and interactions **SHOULD** be held in public in accessible, asynchronous and archived places.
4. Project discussions **SHOULD** use normal LSF-hosted communication channels.
5. Projects **MAY** use a documented consensus process or a **VOTE** for any new committers or project manager members, and carefully follow policies for granting access.
6. Projects **MUST** provide a quarterly status report to the Board.
7. Projects **MUST** govern themselves independently of undue commercial influence, and for the best interests of the project community as a whole.

Technical

1. The primary source control repository **MUST** be administered by the LSF Infra team on LSF organizational accounts.
2. Project **SHOULD** follow available tests and validation, preferably included in a continuous integration process.
3. Project **SHOULD** use common LSF projects set-up.
4. Projects **SHOULD** use fully open source tool chains: all tools used in a Libre Space project **SHOULD** be open source and compatible to avoid locks.

Legal

1. Projects **MUST** use an open-source copyleft license for anything developed and released within the project, clearly marked in the source repository including LICENSE, and source headers.
2. Projects **MUST NOT** include software with unapproved or restricted licenses in Libre Space project releases unless following explicit exceptions.
3. Projects **MAY** include software with approved compatible licenses in Libre Space project releases.

Brand

1. Project websites and materials **MUST** comply with the Libre Space Project Branding Requirements.
2. Projects **MAY** request trademark registration and ownership by Libre Space Foundation.

Press & Marketing

1. Projects **MUST** work with Board Champion and Communications team on any formal press releases.
2. Projects **SHOULD** work with LSF Communications team to help coordinate any press, media, or analyst relations, or for marketing assistance.

How LSF assists

For all approved LSF projects the following support applies:

1. LSF **SHOULD** provide all needed infrastructure and tools for project development, deployment and operations. (e.g. repositories, discussion forums, servers)
2. LSF **SHOULD** sponsor the creation of a brand identity if the project is missing one.
3. LSF **SHOULD** provide legal guidance and help for a project.
4. LSF **MUST** provide governance, management and development guidance as requested by a project.
5. LSF **MUST** evaluate funding applications as submitted by a project and, if approved by the board, provide the funding and support around it. (e.g. development funds, internships, travel funding, event funding, tools and hardware).
6. LSF Board Champion of the project **MUST** work closely with the project manager or committee to ensure timely goal execution and smooth project development.

Joining Process

1. A project interested in joining Libre Space Foundation should review the conditions above and note possible incompatibilities or points needing clarification and/or discussion.
2. The project should initiate contact with the Board sending an email directly to a board member or board@ expressing interest.
3. The Board appoints a Board Champion to work with the project ensuring compatibility of the application.
4. The Board votes on accepting the project as a Libre Space Foundation project.
5. All necessary actions regarding project transition to LSF Project are done by the Board Champion and the Libre Space Foundation Operations team.
6. Communications team coordinates the announcement of the project joining LSF.

1.1.4 Project Proposing

- *Overview*
- *Procedure*
 - *1. Ideation*
 - *2. Documentation*
 - *3. Feedback*
 - *4. Approval*
 - *5. Evaluation*

Overview

This is the recommended process to propose a new project regardless of scale within LSF. The overall process looks like this: A Core contributor, contributor, or community participant has an idea, documents it, asks for feedback, submits for approval to LSF board, runs the project and then LSF core contributors and board review it on regular basis or at specific dates.

Procedure

As a Core contributor you may have an idea about a specific project for LSF. It might be something new or building on top of existing projects and ideas.

Note: This is a process to be followed by Core Contributors. If you are not a Core contributor but have an idea for a project, please reachout to one of the Core Contributors to help you.

1. Ideation

The first step of this process, would be the immediate ideation among the person (or persons) that came up with the idea. It is important the following items to be checked:

- The proposed project pushes the Libre Space Manifesto forward and abides by it.
- The people involved could have the capacity (priorities considered) to undertake the project.
- An initial resources (budget and people allocation) is made for the project
- A set of goals is set that align with the overall LSF strategy
- A set of measurable metrics and impact is set to be evaluated in a 3-month period (or 6 for larger projects)
- Basic project roles are identified (see *Roles*)

2. Documentation

The person responsible for the project idea, documents it by filling a [Template Issue](#) in our lsf-core private repository.

3. Feedback

After the proposal issue is created, the proposing person, ensures that there is visibility for this proposal at a LSF Core level by:

- Posting on Core Contributors section in community.libre.space
- Posting on #lsf-core channel at Matrix
- Mentioning it on Monday and daily core group meetings
- Reaching out specifically to certain contributors to solicit feedback on the proposal

After discussions and possible feedback sessions are made then the points and possible alternation to the proposal should be reflected in the original proposal issue by the proposing person.

4. Approval

When the proposing person believes that the feedback loop is complete, submits the project for approval to the lsf-board by adding a comment “Ready for review” at the proposing issue.

The lsf-board group meets weekly and will be reviewing any proposed proposals when they are ready.

Three different outcomes are possible: 1. Approval, in which case the project is commenced and issue is moved to Doing, 2. Rejection, where the issue is closed and tagged as Rejected, 3. More info needed, where a board member takes responsibility to have a feedback loop with the proposing person.

5. Evaluation

After a fixed period of 3 (or 6) months, a full project impact and results evaluation should be conducted as a public presentation to lsf-core group as the responsibility of the assigned project champion. The project might be concluded, extended or made permanent based on lsf-board decision.

1.1.5 Roles

- *Project Manager*
- *Project Champion*

Project Manager

While there are different scales of projects in LSF, in the broadest sense, project managers (PMs) are responsible for planning, organizing, and directing the completion of specific projects for LSF while ensuring these projects are on time, on budget, and within scope.

Specifics on the tooling and processes can be found in *Project Management*.

Project Champion

In order to ensure efficient and in-time resource allocation, each project employs a project champion role that is responsible to:

- Document project progress and report back to the rest of the org
- Communicate clear priorities and resource needs to the rest of the org
- Timely identify blockers and seek resolutions
- Critically analyzing and ensuring best practices for project management in collaboration with the Project Manager

It is possible that Project Champion and Project Manager is the same person, although it is envisioned as a separate individual for the larger projects of the org.

1.1.6 What is an LSF project?

Libre Space Foundation is home to a range of open source space projects, each working with their own collaborative community style to create technologies compatible with the [Libre Space Manifesto](#).

Within this documentation you can find details about the way Libre Space Foundation projects work, join the Foundation and are managed.

1.2 People

1.2.1 Board

- *Joining*

Libre Space Foundation Board is the governing body of LSF. As the highest leadership body of the Foundation and to satisfy its fiduciary duties, the board is responsible for:

1. Determining the mission and purposes of the Foundation
2. Selecting and evaluating the performance of the chief executive
3. Strategic and organizational planning
4. Ensuring strong fiduciary oversight and financial management
5. Fundraising and resource development
6. Approving and monitoring the Foundation’s programs and services
7. Enhancing the Foundation’s public image
8. Assessing its performance as the governing body of the Foundation

Joining

A new member joining the board requires an existing board member nomination and a unanimous decision among the current board members.

1.2.2 Core Contributors

Volunteer and paid contributors to LSF that have showcased substantial contributions in one or more projects of the Foundation and alignment with the Libre Space Manifesto, are invited by the board to participate in the “Core Contributors” group.

Current “Core Contributors” can be found in the [About Us](#) section of the Libre Space website.

Being a member of “Core Contributors” grants the individual the following privileges and duties:

1. Recognition in libre.space website About section
2. Access to private “Core Contributors” discussion group in community.libre.space
3. Access to #lsf-core matrix channel
4. An email account of @libre.space format
5. Membership to LSF Core group on GitLab
6. Access to cloud.libre.space
7. Participation to LSF All-Hands (annual get together of all core contributors)
8. Commitment to represent, spread and uphold the Principles and Pillars of the Libre Space Manifesto

Joining

Joining the “Core Contributors” group requires a nomination by an existing member and approval by the LSF board.

Onboarding

Once a new member is approved for the “Core Contributors” group the following actions should happen:

- creation of the email account and instructions for setup sent
- addition of the email account to the appropriate aliases
- invite the core contributor to add the email account in hr email alias
- grant access to appropriate Gitlab groups and repositories
- invite to appropriate matrix.org channels
- addition to lsf-core group on community.libre.space
- creation of cloud.libre.space account and appropriate group membership
- access to specific tools depending on role (social accounts, devops, monitoring etc)
- updating of About Us page on libre.space
- updating of lsf-contributors.ods with details of the process
- email to all LSF welcoming the new member

1.2.3 Paid Contributors

Paid contributors are a sub-set of our Core Contributors. In this page you can find information this is specific for our Paid contributors, otherwise known as employees.

Onboarding

Besides the onboarding specified in the Core Contributors documentation there a few extra information that is needed to be communicated and arranged, contracts to be signed etc. An onboarding meeting will be setup to explain in detail.

Compensation

Your monthly compensation will be transfered to you at the last week of each month or within a week of you filling your invoice at bank @ libre.space (if you are under a freelance contract).

Time off

When you need to be off work please make sure to follow the following guidelines:

Sick leave

Paid time-off

Unpaid time off

Parental leave

1.2.4 Conflict Resolution

- *Overview*
- *Private Meeting*
- *Involving a Mediator*
- *Seek Guidance*

Overview

Working with other people may sometimes lead to disagreements. These disagreements may start as engineering decision disputes but can evolve to personal or emotional conflicts. In most cases, such disagreement are extinguished at the spot during day-to-day communication and do not lead to major conflicts. This section describes a formal process followed in Libre Space Foundation to negotiate and resolve conflicts between individuals. The process is mainly based on private meetings between the individuals and a defined course of action which should resolve any conflict as early as possible.

Private Meeting

This is the first action that should be attempted to resolve a conflict. The offended party is defined as the individual who recognizes first that a conflict exists with another individual. The offending party is defined as the other individual in the conflict. The offended party communicates to the offending party the will to invoke the current process. Both parties hold a private meeting to discuss the issue at hand on a mutually agreed time and place. The parties discuss and attempt to reach an agreement. If an agreement is not reached and the conflict still continues, then they move to the next action.

Involving a Mediator

This is the second action that should be attempted to resolve a conflict, if the previous action fails. The parties agree on a mutually accepted mediator, invited as a facilitator to their discussions. The offended, offending parties and the mediator hold a private meeting to discuss the issue at hand on a mutually agreed time and place. The parties discuss and attempt to reach an agreement, with the help of the mediator. The mediator shall use their skill to improve communication between the parties and must be very careful not to express opinion or take the side of any party. If an agreement is not reached and the conflict still continues, then they move to the next action.

Seek Guidance

This is the last action that should be attempted to resolve a conflict, if the previous action fails. The parties seek guidance and advice on how to reach an agreement from Libre Space Foundation Board. Libre Space Foundation Board is the body responsible for preserving cultural integrity and leading transformations within the organization.

1.2.5 LSF Code of Conduct

- *The LSF Guidelines in a nutshell*
- *The LSF Statement of Principles*
- *The LSF Code of Conduct*
 - *Sharing Different Ideas, Dealing with Disagreements, Carrying Inclusive Conversations*
 - *Providing feedback and Criticism*
 - *Collaborations, leadership, accountability*
 - *Unacceptable Behaviours*
 - *Consequences of Unacceptable Behavior*
 - *When and How to Use These Guidelines*
 - *Reporting*
 - *Ask Questions*
 - *License and Attribution*
 - *Modifications and Updates to these Guidelines*

The strength of the Libre Space Foundation is its people; who make up a majestic, diverse, collaborative and inclusive community. As such, we at Libre Space Foundation have compiled the Participation Guidelines for the LSF Community, including the code of conduct and statement of Principles.

These are inspired by the LSF Manifesto. And they are created with primarily one thing in mind: creating an environment where humans from around the world will be able to contribute, learn and evolve at their own pace. With mutual respect and freedom to share ideas and opinions that will help make Space humanity's future. With these Guidelines, the LSF Community should be granting its members an opportunity to explore (their potential freely), develop (their skills), use (the knowledge acquired), and (help them) thrive differently. A way to ensure the longevity, sustainability, openness, equality of those efforts for all humanity ... (and for all the members of the community alike).

The LSF Guidelines in a nutshell

Celebrate our Similarities and Accommodate our Differences

The LSF Community is made up of individuals coming from many different cultures and backgrounds. Cultural differences can encompass everything; from religious beliefs to political views, to personal habits and clothing and to technology as well. Be respectful of people with different cultural practices, attitudes, ideas and beliefs. Focus on eliminating your own biases and discriminatory practices. Instead of criticising, work on eliminating your prejudices. Always put yourself into the other person's shoes-think of their needs from their point of view. In interaction, do not ignore the preferred titles (including pronouns) and be careful with using the appropriate tone of voice. Respect people's right to privacy and confidentiality. Respect their process and the time they need to get accustomed to new practices, information and a new environment. Be open to learning from others and helping others to learn. Respect the time they

need to adapt and allow for questions, worries and thoughts while learning. Interactions with people from different cultures take time to ease into a smooth process. Be respectful, open and inclusive.

The LSF Statement of Principles

We value discussion, trust, accountability and collaboration

Be Open

To knowledge, approaches, different opinions. To making mistakes, asking questions, providing answers. About your problems, obstacles and new ideas.

Be Collaborative

With everyone within the community and outside of it (for that matter). Help educate those who know less than you do, and ask to acquire knowledge. Steer away from unstructured criticism. Feedback is always welcome but judgement is not.

Be Respectful

Differences of opinion, approaches and techniques will arise, but knowing how to solve those is of primary significance. Please be kind and courteous. There's no need to be mean or rude.

Be Considerate

Be aware of the impact of your words and your behaviour and how these may be affecting others. Intense interactions may affect other people in ways you fail to understand.

Be Transparent

If you disagree state your disagreement. If you are facing a problem let your close collaborators know. Be direct with the things you disagree on and form your argument in a constructive way.

Create a Safe, respectful and collaborative environment for everyone to thrive in regardless of their:

- Background
- Family status
- Gender
- Gender identity or expression
- Marital status
- Sex
- Sexual orientation
- Native language
- Age
- Ability
- Race and/or ethnicity
- Caste
- National origin
- Ethnic Origin
- Socioeconomic status
- Religion

- Political Views
- Geographic location
- Any other dimension of diversity

The LSF Principles are created to set the tone for individuals and groups to interact and collaborate freely and respectfully to the community's mutual advantage.

The LSF Code of Conduct illustrates both the expected and prohibited behaviour.

The LSF Code of Conduct

Sharing Different Ideas, Dealing with Disagreements, Carrying Inclusive Conversations

We value discussion and sharing of different ideas, approaches and points of view. Therefore, consciously seeking diverse perspectives. Ask for different opinions. Diversity of views and of people on teams fuels innovative solutions, even if the process is not always comfortable or smooth. Encourage all voices. Allow space for new perspectives to be heard and try to listen actively.

Be open to different possibilities, to different truths. But most importantly be open to the possibility of being wrong.

If you find yourself dominating a discussion, it is significant to step back and encourage other voices to speak. Be aware of how much time is taken up by the dominant members of the group. Provide alternative ways to contribute or participate when possible.

In a conversation, be inclusive by respecting and facilitating people's participation in the interaction. Everyone should be joining a conversation regardless of whether they are: Remote, A native speaker or not, Coming from a different culture, Located in a different time zone, Facing any number of challenges that make their participation difficult

Stand up for your opinion and approach and hold your ground if you disagree. A well-structured conversation will teach us all something new. While disagreement is welcome poor manners and/or abusive behaviour is not. And it will not be tolerated.

Be Open and Direct when we disagree and when we believe that improvement is necessary. Withholding hard truths from collaborators does not make the process better-in fact it worsens the situation. But keep unstructured critique to a minimum.

Be direct, constructive and positive. Positive is the keyword here. Step up when you must take responsibility for the impact of your actions, words and your mistakes – if someone says they have been harmed through your words or actions, listen carefully, apologize sincerely, and correct the behaviour going forward.

Providing feedback and Criticism

Being respectful when providing criticism is as important as being open to receiving it. Be conscious and on the lookout for the right moment to share the criticism with the other person. Be direct with delivering the truth but do so in a kind and respectful way. Do not be offended if it is hard for others to receive your truth. Allow time and space for the other person to receive the information you shared. Make sure the feedback you share is focused solely on the other person's work and not on their personality. Make it clear that the approach or the technique followed is falling short and not the other person's skills or aptitude or their capacity to do something. Refrain from using diminishing language.

Collaborations, leadership, accountability

If you don't know something, ask questions and seek answers. Ask for help when unsure. Nobody is expected to be perfect or to hold all the knowledge and answers within a community. Be open to asking and receiving questions always in a respectful way. Asking questions early on helps avoid many misunderstandings and problems. When asked a question, be responsive and helpful.

Take up leadership and responsibility. Lead by example and encourage other members to do so. Encourage new participants to feel empowered to lead, to share ideas, to take action, to experiment when they feel that a project should be handled differently in order for it to improve. Leadership can be exercised by anyone simply by taking action. There is no need to wait for recognition when the opportunity to lead presents itself.

Match your words with your actions. Your actions not only do they influence others but they also have an impact on the way the Community works, communicates and collaborates. Be a link of inclusivity and openness. Design your projects and work for inclusion. To enable others to become a part of it. Hold yourself and others accountable for inclusive behaviours and make decisions based on the Principles of the Libre Space Manifesto.

When somebody disengages themselves from a project or decides to leave the project altogether, it is preferred that they do so in a way that eliminates (if possible) or minimises disruption of the project. They should notify people in due time and take the necessary steps to ensure that others can pick up where they left off.

Unacceptable Behaviours

The following behaviours are unacceptable within our community:

- **Personal Attacks.** In a diverse Community, conflicts will inevitably arise. But differences in opinion or approach often lead to frustration and to a personal attack. It is not acceptable to insult, demean or belittle others. Attacking someone for their opinions, beliefs and ideas is not acceptable.
- **Unwelcome Sexual Attention or Physical Contact.** Unwelcome sexual attention or unwelcome physical contact is not acceptable. This includes sexualized comments, jokes or imagery in interactions, communications or presentation materials, as well as inappropriate touching, groping, or sexual advances.
- **Violence and threats of violence**
- **Derogatory comments,** related to gender, gender identity and expression, sexual orientation, disability, mental illness, physical appearance, body size, race, religion, politics or socioeconomic status. Avoid using overtly sexual aliases or other nicknames that might detract from a friendly, safe and welcoming environment for all.
- **Posting or threatening to post other people's personally identifying information ("doxing").**
- **Deliberate intimidation**
- **Advocating for, or encouraging, any of the above behaviour.**
- **Private harassment is also unacceptable.**

No matter who you are, if you feel you have been or are being harassed or made uncomfortable by a community member, please contact *conduct at libre.space* immediately. Whether you're a regular contributor, a paid employee, a volunteer or a newcomer, we care about making this community a safe place for you and we've got your back. A community where people feel uncomfortable or threatened is not a productive and inclusive community.

Consequences of Unacceptable Behavior

Unacceptable behaviour from any community member (paid employee or volunteer), including those with decision-making authority, will not be tolerated.

Anyone asked to stop unacceptable behaviour is expected to comply immediately.

We don't tolerate behaviour that excludes people in socially marginalized groups.

If a community member engages in unacceptable behaviour, the LSF team may take any action they deem appropriate, up to and including a temporary ban or permanent expulsion from the community without warning.

Reports of harassment/discrimination will be promptly and thoroughly investigated by the people responsible for the safety of the LSF environment. Appropriate measures will be taken to address the situation.

In addition, any members of the LSF Community who abuse the reporting process will be considered to be in violation of these guidelines and subject to the same consequences. False reporting, especially to retaliate or exclude, will not be accepted or tolerated.

When and How to Use These Guidelines

These guidelines outline the behaviour expectations of all the members of the community and contributors. Whether offline or online, during virtual events or individual conversations, online meetings or on the public channels, throughout all the activities, operations, and projects. Your collaboration is necessary and your participation is contingent upon following these guidelines throughout all the LSF activities, including but not limited to:

- Collaborating in Libre Space Foundation spaces (hackerspace.gr).
- Collaborating with other contributors and other community members online or co-located.
- Representing LSF at public events.
- Representing LSF in social media (official accounts, staff accounts, personal accounts, Facebook pages).
- Participating in workshops and training whether online or offline.
- Participating in the Libre Space Foundation Community forums, mailing lists, wiki pages, websites, chat channels, groups or person-to-person meetings, and all LSF-related correspondence and communication.

The Code of Conduct and its Guidelines are an active topic as we continuously seek to make the community even more inclusive and diverse. We anticipate and welcome the Community's feedback in order to help us further enhance and outline the appropriate boundaries so that we create a safe and inclusive space (see what we did there..) for everyone to thrive in.

Reporting

If you believe you're experiencing unacceptable behaviour that will not be tolerated as outlined above, please contact *conduct @ libre dot space* to report. Reports are received by Nikoletta and Fredy.

After receiving a concise description of your situation, we will review and determine the next steps.

Please also report to us if you observe a potentially dangerous situation, someone in distress, or violations of these guidelines, even if the situation is not happening to you.

If you feel you have been unfairly accused of violating these guidelines, please follow the same reporting process.

Ask Questions

Feel free to reach out to us and ask any questions you might have about these guidelines. Your input is welcome.

License and Attribution

This set of guidelines is distributed under CC-BY-SA

Modifications and Updates to these Guidelines

The LSF Participation Guidelines (Statement of Principles and Code of Conduct) will be amended from time to time so as to include, support and protect the well being of the Community and its members. This also means that the procedures may also be updated from time to time. Therefore, you are kindly requested to keep an eye on the Guidelines and be aware that your agreement to comply with the guidelines will be deemed agreement to any changes to it.

1.2.6 Overview

Libre Space Foundation is a vibrant organization comprised of multiple individuals around the world. This section of the documentation caters to their needs, helping with definitions and processes. Among others, it contains topics related to joining, training, engaging, coaching and cooperation between individuals. Processes developed and documented in this section are meant to become useful tools for cultivating a common culture across the organization; a culture which is based on principles of self-management, self-governing, self-organizing and pure peer relationships.

1.3 Event Management

1.3.1 Overview

LSF contributors regularly attend or organize meetings to promote our projects and engage with the broader community. This page describes the process which should be applied for all events.

1.3.2 Prepare

Think about what do you want to get out of the event participation. Plan carefully and as much in advance as possible. If needed, feel free to notify or ask for help on the [community forums](#).

Check [previous presentations](#) and you can also use [LSF logos \(and related designs\)](#).

1.3.3 Propose

Make sure to follow the instructions of the event and propose your participation (booth, talk, session, paper etc) as soon as possible. In case you need financial (or other) help with attending and representing LSF at the event, make sure to use [this form](#) to request for assistance.

1.3.4 Attend

Be present, be active, keep notes on contacts and meetings, as well as document interesting things you see and might be of interest in the LSF community.

1.3.5 Report

Post back at the community forums for how the event went, as well as any recordings made, contacts acquired and follow-ups needed.

1.3.6 Reimbursement

Scan all your receipts in a single PDF, then sum the amount and convert it to EUR, and post the file and details to receipts@libre.space.

1.4 Meetings

Meetings can be called either on-demand or regularly. To avoid any miscommunication and facilitate syncing between meeting participants, it is recommended to follow the following guidelines.

1.4.1 Calling for meetings

1. **Define a goal**

Every meeting needs to have a goal. The goal should be clear in order to give direction to the discussion.

2. **Define the agenda**

All meetings must have an agenda. The agenda helps participants focus and keep the meeting within its time constraints. The agenda should at least contain:

1. The **topic** and **subtopics** to be discussed
2. Possible **preparation** required by participants to be able to attend

3. **Define participants**

The participants should be separated between:

1. **Mandatory** participants
2. **Optional** participants

4. **Define time**

The meeting should take place within a specific time-frame. The time-frame should be such that all mandatory participants can attend. Try not to exceed 1h to avoid fatigue. Use free/busy information, if available, to minimize chances of rescheduling. The meeting should be scheduled far enough into the future to let participants respond in time for their availability. Always add some extra time; meetings usually run overtime.

5. **Define location**

The location, either physical or virtual, should be defined.

6. **Set reminders**

Participants should be reminded in some way when a meeting is starting soon.

7. **Make resources available**

Any resources needed to execute the meeting (documents, pages, links, etc.) should be available to the participants either directly or as links.

Calendar invitations

The most common way to call for meetings is through calendar event invitations. The recommended mapping between meeting properties and calendar invitations is:

Invitation	Meeting
Start time	Start time
End time	End time
Title	Agenda topic
Description	Agenda
Location	Location
Required attendees	Mandatory participants
Optional attendees	Optional participants
Reminders	Reminders (e.g. 15 mins before start)

1.4.2 Responding to invitations

Participants are expected to respond to invitation as soon as possible. Always check your calendar to avoid double booking and always account for possible time needed to prepare before responding to an invitation. It is acceptable for participants to completely deny attending or ask to reschedule a meeting. In any case, always reply with the reason.

1.4.3 Initiating meetings

To start a meeting, the following guidelines should be followed:

1. **Small talk for 5 minutes, if possible**

This helps people to start talking and also allows time for everybody to gather.

2. **Assign roles**

The following roles shall be assigned to people at the start of the meeting:

1. **Leader** - The person who leads the discussion; usually the person who called the meeting
2. **Notekeeper** - The person who keeps minutes of the meeting
3. **Kanban master** - If the meeting involves a Kanban board review, the person who goes over the Kanban cards (e.g. GitLab issues)
4. **Timekeeper** - The person who makes sure that the meeting runs on schedule
5. **Participant** - Anyone who is invited and attends the meeting

1.4.4 Participating

To make meetings more efficient, the following guidelines should be followed after meeting starts:

1. Always try to stick to the agenda and the meeting goal, as defined by the organizer
2. Come up with clear action items which can be later documented as tasks for people undertake
3. Avoid overrunning the scheduled meeting time; people may have scheduled other tasks after the meeting

1.4.5 Post-meeting actions

After the end of the meeting, the meeting notes should be published by the **Notekeeper** and all action items should be filed as tasks to the task track system (e.g. GitLab issues) by all participants assigned to them.

1.5 Communication

Libre Space Foundation uses various channels, technologies and methods to communicate among its members, projects and to the world.

1.5.1 External Communications

For a list of external communication channels and specifics around the organization of the Communications Team check out the [Communications Organizational Repo](#) .

1.5.2 Project Communications

Different project employ different types of communications:

Email

Project	Email	Description
LSF - Generic	info@libre.space	Central email for all LSF related inquiries
LSF - Generic	shop@libre.space	Online shop related emails
LSF - Generic	ops@libre.space	Infrastructure related emails
LSF - Generic	ssa@libre.space	Space Situational Awareness team email
LSF - Generic	moc@libre.space	Mission Operations Center email
LSF - Generic	all@libre.space	All LSF core members alias (restricted to LSF emails only)
LSF - Generic	bills@librespace.odoo.com	Incoming email for Odoo accounting system

Real-time communications

Project	Channel	Description	Access
LSF - Generic	#librespace:matrix.org	Generic channel for all LSF projects	Open
LSF - Generic	#lsf-ops:matrix.org	Infrastructure team channel	Invite-only
LSF - Generic	#lsf-core:matrix.org	Channel for all LSF Core members	Invite-only
LSF - Generic	#librespace-comms:matrix.org	Communciation team channel	Invite-only
LSF - Generic	#librespace-board:matrix.org	LSF Board channel	Invite-only
SatNOGS	#satnogs:matrix.org	SatNOGS project main channel	Open
SatNOGS	#satnogs-dev:matrix.org	SatNOGS Developers channel	Open
SatNOGS	#satnogs-missions:matrix.org	Missions using SatNOGS	Open
SatNOGS	#satnogs-operators:matrix.org	Channel for SatNOGS scheduling and operators	Invite-only
SatNOGS	#satnogs-comms:matrix.org	SatNOGS COMMS cubesat subsystem project	Open
SatNOGS	#satnogs-optical:matrix.org	SatNOGS Optical Ground Station development	Open
SIDLOC	#sidloc:matrix.org	SIDLOC spacecraft ID and localization project	Open
PQ9ISH	#PQ9ISH:matrix.org	PQ9ISH Pocketqube standard and compatible projects	Open
QUBIK	#qubik:matrix.org	QUBIK and PICOBUS, pocketqube LSF projects	Open
stvid	#stvid:matrix.org	stvid, optical ssa observations project	Open
OCSW	#oscw-public:matrix.org	Open Source Cubesat Workshop	Open
OSCW	#oscw:matrix.org	OSCW organization committee	Invite-only
Polaris	#polaris:matrix.org	Polaris machine learning project	Open
Metasat	#metasat:matrix.org	Metasat project	Open
Cronos Rocket	#cronos-rocketry:matrix.org	Cronos Rocketry project	Open

1.6 Procurement

For various project and activity needs, contributors of LSF need to procure various items or services. Here is a brief outline and some guiding principles

1.6.1 Procurement Process

1. Identify the need and thing about possible future evolution of this need.
2. Check with Lab (contacting Aris) on possible existing stock
3. Identify the best vendor possible taking into account lower price but also a prioritization with regards to vendor location. The priority is as follows:
 1. EU vendor with valid VAT VIES number
 2. Greek vendor with VAT number
 3. Non-EU vendor with local VAT number (avoid if possible!)

4. Any vendor without a VAT number (avoid if possible!)
4. Request a proforma invoice to be issued (unless specific vendor below) to LSF Company details.
5. Forward to bank@libre.space for payment via bank transfer or via a card purchase link. We prefer bank transfer over paypal.
6. Once paid, you will receive confirmation from the people behind bank@
7. Once the items arrive, scan and forward the invoice to bills @T librespace.odoo.com

1.6.2 Specific Vendors

The following vendors have been used extensively in the past and should be preferred since we have a special setup (See notes)

Vendor	Type	Username	Access	Notes
Mouser	Components	librespacefounda-tion	Pierros, Agis, Il-ias	Company account, Details com-pleted
Digikey	Components	pier-ros@libre.space	Pierros	Company account, Details com-pleted
Farnell	Components	librespace	Pierros	Company account, Details com-pleted
Mini Cir-cuits	Components		Pierros	Details for export control added
Discomp	Networking		Pierros, Aris	Company discount and details en-tered
JLC PCB	PCB Produc-tion	pier-ros@libre.space	Pierros, Agis, Il-ias	Company account, Details com-pleted

If you require a purchase from the vendors above, please reach out dircetly to someone with access.

1.6.3 Company Details

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 Athens
 11144
 Greece
 +302130210437
 VAT ID: EL997539194

1.7 Hardware Development Guidelines

- *Overview*
- *Design*
 - *Repository*
 - *KiCad and FreeCAD Workflow*
 - *Electronics Parts*
 - *KiCAD Preferred settings*
 - *FreeCAD Preferred settings*
 - *Releases*
- *Fabrication*
 - *PCB Ordering*
- *Assembly*
 - *PCB assembly*
 - *Mechanical Parts assembly*
 - *Cables assembly*

1.7.1 Overview

This guide refers to practices that is followed for hardware projects. It contains 3 sections:

1. design
2. fabrication
3. assembly

Each of the sections refer to a different stage of hardware development.

1.7.2 Design

Repository

The repository of a hardware project must include:

1. License file for example, [CERN Open Hardware Licence Version 2 - Strongly Reciprocal](#)
2. Libre Space Foundation [Contribution Guide](#)
3. Git ignore files for different kind of programmes, like KiCad, FreeCAD and QUCS.
4. In case of CAD files, e.g. FreeCAD, it is recommended to use [Git LFS](#)
5. For project management follow, [recommended Mode of Operation for Libre Space Foundation projects](#)
6. An (under test) method to keep track of issues with epics and/or milestones is followed at [SIDLOC project - issue and some notes](#)

KiCad and FreeCAD Workflow

1. KiCad workflow for multiple boards is under test in [SIDLOC project](#) and here is the [description of method](#)
2. FreeCAD workflow uses [Git LFS - File Locking](#)

Electronics Parts

1. An inventory with electronic parts is kept in LSF lab. For that reason it is recommended to select parts from inventory that the threshold of minimum order is above 20 (more details TBA)
2. Parts like MCUs, PSUs etc are preferred to re-used for all the projects
3. Preferred [vendors](#)
4. For Board to wire connectors the Molex - PicoBlade and Hirose - DF11 series are preferred
5. A [Libre Space Foundation KiCad Library](#) exists. It is advised to use parts from it (or KiCAD libs). In case that a part does not exist a merge request in to library is more than welcome
6. To export a BOM, for e.g. Mouser, use either `bom_csv_grouped_by_value` and from generated .csv use the second table of follow a guide: [The Generation of Bill of Material Files](#)

KiCAD Preferred settings

1. Schematic grid size: 1.27mm
2. PCB Logos: project logo, license logo and Libre Space Foundation logo.
3. CI for [KiCad \(Under development\)](#)
4. Add Fiducial points that help stencil alignment in stencil printer

FreeCAD Preferred settings

1. For fabrication drawings use [Libre Space Foundation templates](#)

Releases

The release scheme is under development and testing in [SatNOGS COMMS project](#)

1.7.3 Fabrication

PCB Ordering

1. Preferred [vendors](#) are to be followed
2. Tag a release on the hardware repository and write all production details like [this](#) .
3. Ping people with access according to Procurement policy.
4. Note: Stencil size (maximum) 180x220 mm (due to stencil printer)

1.7.4 Assembly

PCB assembly

Libre Space Foundation uses hackerspace.gr laboratory with:

1. Reflow oven, TBD
2. Pick and Place, TBD
3. Stencil printer, TBD

Mechanical Parts assembly

TBD

Cables assembly

TBD

1.8 Glossary

The purpose of this document is to provide a reference for acronyms and terms used in the Libre Space Foundation community and contributors may cross reference any of the supplied terms.

AB

Abstract

ABCL

As-built Configuration Data List

AC

Alternating Current

ACI

Adjacent Channel Interference

ACS

Attitude Control System

ACU

Antenna Control Unit

ADC

Analog to Digital Converter

AFSK

Audio Frequency Shift Keying

AFT

Abbreviated Functional Test

AGC

Automatic Gain Control

AGPL

Affero General Public Licence

AI	Artificial Intelligence
AIT	Assembly Integration and Testing
AIV	Assembly Integration and Verification
AM	Amplitude Modulation
AMSAT	Amateur Satellite
AOCS	Attitude and Orbit Control System
AOS	May refer to: Acquisition Of Signal or, Advanced Orbiting Systems
API	Application Programming Interface
APT	Automatic Picture Transmission
ARRL	American Radio Relay League
ARTES	Advanced Research in Telecommunications Systems
ASIC	Application-Specific Integrated Circuit
ASW	Address and Synchronization Word
AXI	Advanced eXtensible Interface
B2B	Business to Business
B2C	Business to Consumer
BaLun	Balanced to Unbalanced
BMU	Battery Management Unit
BER	Bit Error Rate
BOM	Bill Of Materials
BR	Brochure

BPF

Band Pass Filter

BPbis

Bundle Protocol

BPSK

Binary Phase Shift Keying

BSD

Berkeley Software Distribution

CAD

Computer Aided Design

CAN

Controller Area Network

CANFD

Controller Area Network flexible data-rate

CC-BY-SA

Creative Commons Attribution-ShareAlike

CCD

Contract Closure Documentation

CCI

Co-channel Interference

CCSDS

Consultative Committee for Space Data Systems

CDR

Critical Design Review

CEPT

European Conference of Postal and Telecommunications Administrations

CERN

Center for European Nuclear Research

CERN-OHL

CERN Open Hardware Licence

CFDP

CCSDS File Delivery Protocol

CIDL

Configuration Item Data List

CNC

Computer numerical control

COLDSUN

Communications reLay for Deep-Sea Underwater Networks

COMMS

Communications

CONOPS

Concept of Operations

COTS

Commercial off the Shelf

CPLD

Complex Programmable Logic Device

CPU

Central Processing Unit

CRC

Cyclic Redundancy Check

CSS

Cascading Style Sheet

CW

Continuous Wave

D

Deliverable

DAC

Digital to Analog Converter

DB

Database

DC

Direct Current

DL

Deep Learning

DM

Development Model

DP

Data Package

DSN

Deep Space Network

DSP

Digital Signal Processing

DTN

Delay and Disruption-Tolerant Networking

DUT

Device Under Test

DUV

Data Under Voice

DVB-RCS

Digital Video Broadcasting - Return Channel via Satellite

DVB-S2

Digital Video Broadcasting - Satellite -Second Generation

E2E

End-to-End

ECC	Error-correcting code
ECSS	European Cooperation for Space Standardization
EDAC	Error Detection And Correction
EDEN	<i>EGSE</i> Data Exchange Network
EDRS	European Data Relay Satellite System
EDV	Energy Detection Value
EGSE	Electrical Ground Support Equipment
EIRP	Equivalent isotropically radiated power
EM	May refer to: a) Engineering Model b) Electrical Model
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
eMMC	embedded Multi-Media Controller
EMS	Emergency Management Services
ENBW	Equivalent noise bandwidth
ENOB	Effective number of bits
EO	Earth Observing
EPS	Electrical Power System
ESA	European Space Agency
ESOC	European Space Operations Center
ESR	Executive Summary Report
ESSB	<i>ESA</i> Standardization Steering Board

ESTEC

European Space Research and Technology Center

FEA

Finite Element Analysis

FEC

Forward Error Correction

FFT

Fast Fourier Transform

FM

May refer to: Flight Model or, Frequency Modulation

FMC

FPGA Mazzanine Card

FOC

Full Operational Capability

FOSDEM

Free and Open Source Developers European Meeting

FOR

Frame Of Reference

FOV

Field of View

FP

Final Presentation

FPGA

Field Programmable Gate Array

FR

Final Report

FSK

Frequency Shift Keying

GCC

GNU Compiler Collection

GEO

Geostationary Equatorial Orbit

GESTRA

German Experimental Space Surveillance and Tracking Radar

GFSK

Gaussian Frequency Shift Keying

GLONASS

Global Navigation Satellite System

GMAT

General Mission Analysis Tool

GNSS

Global Navigation Satellite System

GPCPU

General Purpose *CPU*

GPL

GNU General Public License

GPS

Global Positioning System

GPSDO

GPS-Disciplined Oscillator

GRAVES

Grand Réseau Adapté à la Veille Spatiale

gRPC

gRPC Remote Procedure Calls

GS

Ground Station

GSE

Ground Support Equipment

GSPS

Giga Samples per Second

GSoC

Google Summer of Code

GUI

Graphical User Interface

HAL

Hardware Abstraction Layer

HDF5

Hierarchical Data Format

HDL

Hardware Description Language

HEEQ

Heliocentric Earth Equatorial

HEO

Highly Elliptical Orbit

HFT

Hidden Factors as Topics

HPA

High Power Amplifier

HPC

May refer to: a) High-performance Computing b) High Pin Count

HTML

Hyper Text Markup Language

HW

Hardware

I2C	Inter-Integrated Circuit
IARU	International Amateur Radio Union
IC	Integrated Circuit
ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IESL	Institute of Electronic Structure and Laser
IF	Intermediate Frequency
IFFT	Inverse Fast Fourier Transform
IO	Input/Output
IOD	In-Orbit Demonstration
IOT	Internet Of Things
IQ	In-phase/Quadrature
IP	Implementation Plan
IP3	Third-order intercept point
IPND	IP-based Neighbor Discovery
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISI	Intersymbol Interference
ISM	Industrial, Scientific, and Medical
ISON	International Scientific Optical Network
ISS	International Space Station

ITT

Invitation To Tender

ITU

International Telecommunication Union

ITU-R

International Telecommunication Union - Radiocommunications

ITU RR

ITU Radio Regulations

JAXA

Japan Aerospace Exporation Agency

JPL

Jet Propulsion Laboratory

KO

Kick-Off

KOM

Kick-Off Meeting

LCNS

Lunar Communication and Navigation System

LGPL

GNU Lesser General Public License

LEDSAT

LED-based Small SATellite

LEO

Low Earth Orbit

LEOP

Launch and Early Orbit Phase

LFSR

Linear-Feedback Shift Register

LNA

Low Noise Amplifier

LO

Local Oscillator

LOS

May refer to a) Line of Sight b) Loss Of Signal

LRPT

Low-Resolution Picture Transmission

LRR

Laser Retro Reflector

LSF

Libre Space Foundation

LSTM

Long Short-Term Memory

LSTN	Library Space Technology Network
LVDS	Low Voltage Differential Signalling
LVTTL	Low Voltage TTL
M2M	Machine To Machine
MCMC	Markov Chain Monte Carlo
MCU	Micro-Controller Unit
MDS	Minimum Detectable Signal
MEO	Medium Earth Orbit
MEX	Mars Express
MGSE	Mechanical Ground Support Equipment
MIB	Mission Information Base
MIMO	Multiple-Input, Multiple-Output
MIT	Massachusetts Institute of Technology
ML	Machine Learning
MLRR	Modulated Laser Retro-Reflector
MoM	Minutes of Meeting
MOOC	Massive Open Online Course
MPL	Mozilla Public License
MPR	Monthly Progress Reports
MRG	Microelectronics Research Group
MRR	Modulated Laser Retro-Reflector

MS

Milestone

MSK

Minimum Shift Keying

MSPS

Mega Samples per Symbol

MSS

Mobile Satellite Service

NEC2

Numerical Electromagnetics Code Version 2

NF

Noise Figure

NIST

National Institute of Standards and Technology

NORAD

North American Air Defense Command

NS-3

Network Simulator 3

NSL

NearSpace Launch

NTE

Nanosatellite Tracking Experiment

OBC

On-board Computer

OCS

Orbit Control System

ODM

Orbit Data Message

OEM

May refer to: a) Original Equipment Manufacturer b) Orbit Ephemeris Message

OOL

Out-of-Limits

OOT

Out-of-Tree (GNURadio Out-of-tree module)

OPS

(Space) Operations

OS

Operating System

OS3

Open Source Satellite Simulator

OSCW

Open Source Cubesat Workshop

OSDLP

Open Space Data Link Protocol

OSI

May refer to a) Open Systems Interconnection b) Open Source Initiative

OTP

One time programmable

PA

Power Amplifier

PAPR

Peak to Average Power Ration

PC

May refer to: a) Project Coordinator b) Personal Computer

PCB

Printed Circuit Board

PCDU

Power Conditioning and Distribution Unit

PCIe

Peripheral Component Interconnect Express

PDM

Product Data Management

PDR

Preliminary Design Review

PLL

Phased Locked Loop

PLM

Product Lifecycle Management

PMIC

Power management integrated circuits

PoC

Proof of Concept

PoE

Power over Ethernet

POSIX

Portable Operating System Interface for Unix

PQ

PocketQube

PSK

Phase-Shift Keying

PSLV

Polar Satellite Launch Vehicle

PV

Photovoltaics

- QA**
Quality Assurance
- QPSK**
Quadrature Phase Shift Keying
- QSFP**
Quad Small Form-factor Pluggable transceiver
- R&D**
Research & Development
- RD**
Reference Document
- RHCP**
Right Hand Circular Polarized
- RF**
Radio Frequency
- RFMC**
RF Mezzanine Card
- RFSoc**
RF System on Chip
- RILDOS**
Radio with Identity and Location Data for Operations and SSA
- RPC**
Remote Procedure Calls
- RR**
Requirements Review
- RSSI**
Received Signal Strength Indication
- RTC**
Real Time Clock
- RW**
Reaction Wheel
- RX**
Receive
- SATA**
Serial Advanced Technology Attachment (hard disk interface)
- SATCOM**
Satellite Communication
- SatNOGS**
Satellite Network Open Ground-Station
- SAW**
Surface Acoustic Wave
- SBC**
Single Board Computer

SC	Spacecraft
SDA	Space Data Association
SDLS	Space Data Link Security
SDN	Software Defined Networking
SDR	May refer to: a) Software Defined Radio b) System Desing Review
SGP4	Standard General Perturbations Satellite Orbit Model 4
SEE	Single-event effects
SESP	Simulation for European Space Programmes
SEU	Single-event upset
SFPT	Satellite Functions and Performance Test
SHF	Super High Frequency (3-30 GHz)
SIDLOC	Satellite Identification and Localisation
SiDs	Simple Downlink Share Convention Protocol
SigMF	Signal Metadata Format
SIMD	Single Instruction, Multiple Data
SMA	SubMiniature version A
SMT	Surface Mount Technology
SNR	Signal-to-noise ratio
SNS	Satellite Network Simulator
SNS3	Satellite Network Simulator
SoC	System On a Chip

SOS	Space Operation Service
SoW	Statement of Work
SPENVIS	Space Environment, Effect and Education System
SPI	Serial Peripheral Interface
SPOC	Spacecraft Operation Center
SPP	Space Packet Protocol
SQNR	Signal-to-quantization-noise ratio
SRF	Software Reuse File
SRS	Space Research Service
SSA	Space Situational Awareness
SSN	Space Surveillance Network
SSO	Sun-Synchronous Orbit
SST	Space Surveillance and Tracking
STM	Space Traffic Management
SW	Software
SWR	Standing Wave Radio
TAS	Technical Achievement Summary
TBD	To Be Described
TC	Tele-command
TC&C	Tele-command & Control
TCP	Transmission Control Protocol

TCXO	Temperature-compensated crystal oscillator
TDMA	Time Division Multiple Access
TDP	Technical Data Package
TID	Total Ionizing Dose
TJD	Truncated Julian Day
TLE	Two Line Element set
TM	Telemetry
TMR	Triple Mode Redundancy
TMTC	Telemetry & Tele-control
TN	Technical Note
TRL	Technology Readiness Level
TT&C	Telemetry, Tracking and Command
TTL	Transistor-transistor logic
TVAC	Thermal Vacuum Chamber
TWT	Travelling-wave Tube
TX	Transmit
UART	Universal Asynchronous Receiver - Transmitter
UAS	Unmanned Aircraft Systems
UHF	Ultra High Frequency (0.3 - 3 GHz)
UI	User Interface
UNOOSA	United Nations Office for Outer Space Affairs

USB

Universal Serial Bus

USLP

Unified Space Link Protocol

UTC

Universal Time Co-ordinated

UX

User Experience

V&V

Verification and Validation

VCO

Voltage - Controlled Oscillator

VGA

Variable Gain Amplifier

VHF

Very High Frequency (30 - 300 MHz)

VNA

Vector Network Analyzer

VOLK

Vectorized Library of Kernels

VHDL

VHSIC Hardware Description Language

VPL

Visual Programming Language

WBS

Work Breakdown Structure

WP

Work Package

WPD

Work Package Description

WRC

World Radiocommunication Conferences

YAML

YAML Ain't Markup Language

- [search](#)

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