Introduction

The purpose of this document is to describe in some detail the process of building a brand new Indy Network (Network) using 4 Stewards on their own separate nodes.

These instructions are intended to be used for a distributed or “production” level environment, but can be adapted to be used to build a private network.

There are much easier methods for building a test environment, if that is all you are needing.

1. Create Network Governance documents (Optional)
   1. Network Governance describes the policies and procedures by which your new network will run and be maintained. Here’s an example: [Sovrin Governance Framework](https://docs.google.com/document/d/1K8l5MfXQWQtpT49-FHuYn_ZnRC5m0Nwk)
2. Assign Network Trustees
   1. Trustee’s are the people who manage the network and protect the integrity of the Network Governance. This includes managing the auth\_rules.
   2. Generally speaking, for a production Network, at least 3 Trustees representing three different persons are required and more are preferred. For a test Network one Trustee is required and 3 or more are preferred (all Trustee DID’s may belong to the same user on a test network if needed).
   3. Initial Trustees (3 preferred) must create and submit a Trustee DID and Verkey so that the domain genesis file can be built.
      1. Have each trustee follow instructions in the [Trustee CLI User Guide](https://docs.google.com/document/d/1tZuoIptnxSDl0B3he-WnF9u9HHiMVVCSF4K3uL4brjc/edit) appendices to install a CLI and create a Trustee DID.
3. Genesis Stewards
   1. A Steward is an organization responsible for running a Node on the Network
   2. Exactly 4 “Genesis” Stewards are needed, more Stewards can be added later.
   3. Each Genesis Steward’s node information will be included in the Genesis Pool file, so they should be willing to install and maintain a Node on the new Network for an extended period of time.
   4. Each Genesis Steward must install their node as per the instructions in the [Steward Validator Preparation Guide v3](https://docs.google.com/document/d/18MNB7nEKerlcyZKof5AvGMy0GP9T82c4SWaxZkPzya4/edit#heading=h.9a4ud1gh7a6x) (with some small adjustments)
      1. Determine a name and a directory name for your new Network then have the stewards substitute in those names in the appropriate places in the Guide.
      2. They all need to stop at the normal place (step 3.5) as instructed in the Guide.
      3. NOTE: There are a few steps in the guide that they will not be able to complete because the network has not yet been created, and the guide assumes that you are adding a node to an existing network.
   5. Create and give Genesis Stewards access to a spreadsheet like [this one](https://docs.google.com/spreadsheets/d/1LDduIeZp7pansd9deXeVSqGgdf0VdAHNMc7xYli3QAY/edit#gid=0) and have them fill out their own row.
4. Create Genesis Files
   1. Use the information provided in steps II.C and III.E above (the Genesis Spreadsheet) as input to the [genesis creation script](https://github.com/sovrin-foundation/steward-tools/tree/master/create_genesis) to create the new genesis files. (Ask me for my “[Genesis file Creation notes](https://docs.google.com/document/d/1HXG6WOl_3K7k63CNdYEiTk1Y3eMiwLuhr5uTHg3RaoY/edit?usp=sharing)” if you need help with this one)
   2. Check in or store Genesis files in a place where your users can access them.
   3. Distribute the new genesis files to the Genesis Trustees and tell them which directory to copy them into. i.e. /var/lib/indy/<The directory name determined in step III.D.1>
5. Schedule a meeting to instantiate the new network
   1. Invite all Genesis Stewards to a meeting where they are able to execute commands and share their screens for both an indy-cli and for their Validator Nodes being added to the Network.
   2. NOTE: It is very useful to go through some checks for each node to verify their setup before continuing. Some large amounts of debug and recovery work can be avoided by 5-10 minutes of checking configs of each node at the beginning of the meeting.
      1. /etc/indy/indy\_config.py - all nodes need to have the same network name (and that name should be a directory on each node and the genesis files should be in those directories and have the correct permissions.)
      2. /etc/indy/indy.env - all nodes should have local ip addresses in this file and be pointing at the correct ports.
      3. Check network communication from one node to each other node on the client IP and port, and also check from a client on the internet to see that all Client IPs and ports are accessible. Node ports can be checked after the Network is up and running. (e.g. **nc -vz <IP> <port>** can be used to check connectivity)
      4. Check version numbers (as indicated in the preparation guide).
   3. Have all Genesis Stewards simultaneously walk through the remaining needed steps in the Validator Preparation Guide.
   4. Validate proper functionality of the new network while still in the meeting.
6. Configure the Indy Network
   1. Auth\_rules
      1. Auth\_rules to be determined by network governance requirements.
      2. Can use auth\_rules template in [BuilderNet Reset document](https://docs.google.com/document/d/147DBVTol-BCOiJ-iHfvfm6QBXLgYnddqx1_T0_FQTbk/edit) or [Auth\_Rules](https://drive.google.com/drive/u/1/folders/1xtZxSHhZ584B6NtASdfQEcoai9w6CyhN).
      3. For more information about auth\_rules see [Auth Rules Walkthrough](https://docs.google.com/document/d/1xk0A5FljKOZ2Fazri6J5mAfnYWXdOMl2LwrFK16MJIY).
   2. TAA?
      1. [TAA for CLI Walkthrough](https://docs.google.com/document/d/1Ma-EJkYpRfPOZApyEvcWrkb4EKn71XrIFd9KvZL0Whg)
      2. [Sovrin's TAA folder with setup info and files](https://drive.google.com/drive/folders/1wOZGnJa2qZ2TIHvsUnd41_0CcRGF0n2P?usp=sharing)
   3. Tokens?
      1. [Test-Token Walkthrough](https://docs.google.com/document/d/1iWj9kMvJGnmFMFxItP0w0F0yncS0OgXVwEvLsQrO6D4)
7. Add more Steward Nodes
   1. Recommend adding at least 3 more steward Nodes because 7 nodes are required before the network will continue running with more than 1 node down (With 4 nodes on your network, when 1 node is down the network will continue functioning. But when 2 nodes are down, or at 7 nodes when 3 nodes are down, then writes cannot occur on your network. 3f+1 is the magic formula, where f is number of failed nodes allowed to not have loss of consensus)
8. Network Maintenance
   1. Manual -
      1. Write a monitoring script and run it at least 3x per day
      2. A community managed manual script that you can use is [here](https://github.com/sovrin-foundation/community-tools). (monitornodes.py)
   2. Automated
      1. Add notification to the script and run it once every 15-30 minutes (depending on tolerance levels for downtime and for spam mail. Servers on existing networks regularly lose connection briefly, so a significant amount of false alarms are currently reported by some tools)
      2. There is a current Hyperledger Indy project where several community members are collaborating to build better monitoring tools: [hyperledger/indy-node-monitor](https://github.com/hyperledger/indy-node-monitor)