



CASE STUDY: PROTECTION SETTINGS MANAGEMENT AT CITY POWER



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Introduction

- Modern relays or Intelligent Electronic Devices (IEDs) have increasing amount of functions and settings
- Electrical networks constantly expanding
- How do we manage these relays and their settings?
 - Different formats in hard or soft copy
 - No security
 - Who did what, when, how and why?
- City Power solution, a centralised protection settings management system (psms)



Settings Management

- Correct protection settings are pivotal for security of power system
- Power system engineers have responsibility to calculate and apply correct settings to relays
- Storage of settings crucial for:
 - Relay replacement in event of device failure
 - Testing & Co-ordination studies
 - Audits and investigations
- Storage systems:
 - Hard copy
 - Soft copy like spreadsheet or pdf
 - Database
- Lack of security, audit trail and workflow sequence



City Power Case

- All settings stored in one central spreadsheet
- Only basic parameters captured like:
 - Over current plug setting
 - Over current time multiplier etc.
- Stored on central drive on LAN
- Fine for electro-mechanical relays but not sufficient for modern IEDs
- No security, anybody can access it or change settings
- No workflow sequence management



New System Scope

- Protection Settings Management System (PSMS) that has the following features:
 - Store all protection settings in one centralised system
 - Have full workflow sequence with audit trail
 - Email notification for responsibility handover
 - Easy to navigate
 - Import/Export of settings to and from power system analysis tool
 - Import/Export of relay configuration files
 - Security access control
 - User rights management – who can see what?
 - Full document management



New System at City Power

- New psms has an easy to use web interface which required minimal training
- Navigation is made easier through definition of system hierarchy
- The PSMS has a user defined location hierarchy:
 - Area
 - Substation
 - Bay
 - » Device (Relay, CT, VT etc.)
- Areas created as per geographical area
- Substations filed per geographical area
- Bays created as per equipment type protected, for e.g. ShuntBay; FeederBay; TransformerBay etc



Location Structure

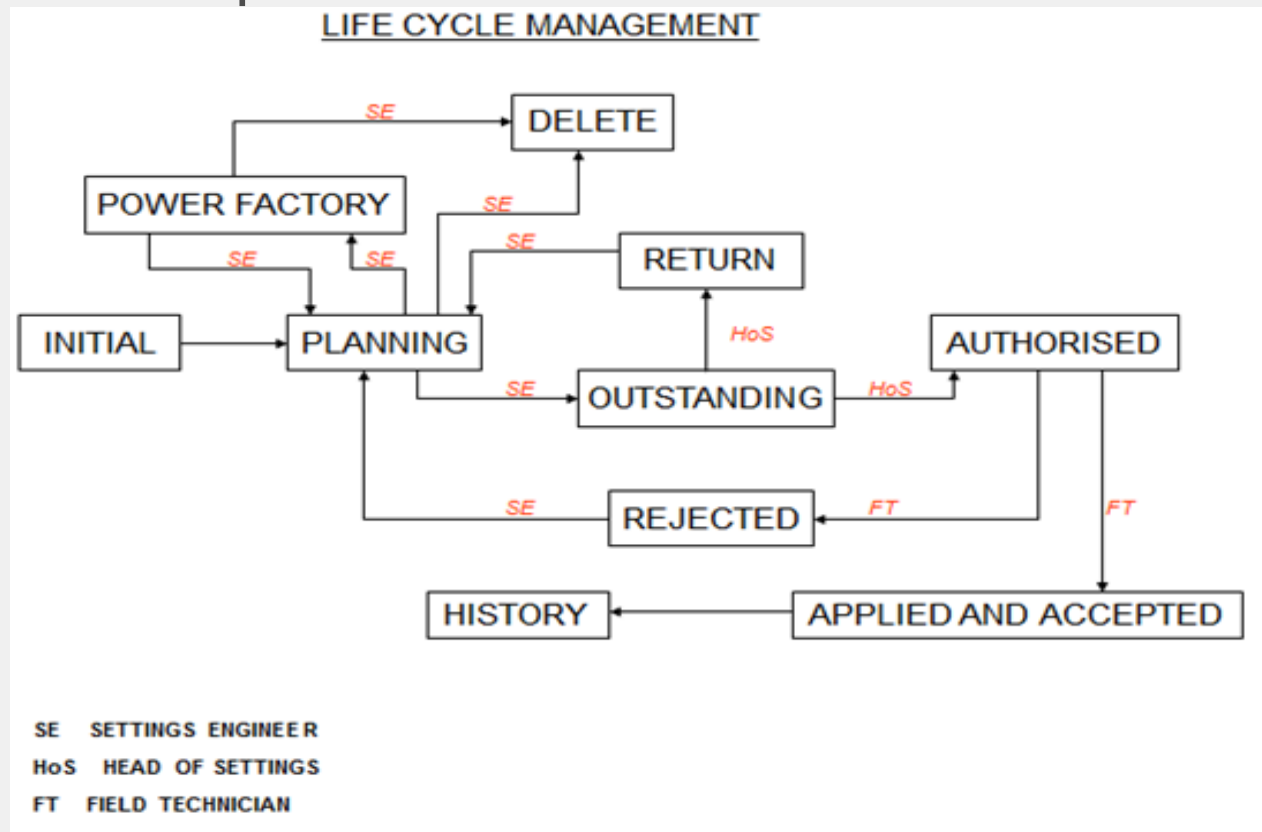
The screenshot displays the CityPower StationWare application interface. At the top, there are navigation tabs for 'Start', 'Reports', 'History', and 'Administration'. Below these is the 'CityPower' logo and the application title 'StationWare'. A table shows the 'Name' as 'CityPower' and the 'Description' field is empty. Below the table, there are two tabs: 'Locations' (selected) and 'Search'. The 'Locations' tab shows a hierarchical tree structure of locations:

- Area: Edenvale
- Area: Johannesburg
 - Substation: Alexandra
 - Substation: Baragwanath
 - Substation: Bellevue
 - Substation: Braamfontein
 - Substation: Bree
 - Substation: Central
 - Substation: Cleveland
 - Substation: Crown SS
 - Substation: Cydna
 - Substation: Delta
 - 88kV_BusCoupler: Buscoupler North
 - 88kV_BusCoupler: Buscoupler South
 - 88kV_BusSection: Bussection
 - 88kV_FeederBay: Fort 1
 - 88kV_FeederBay: Fort 2



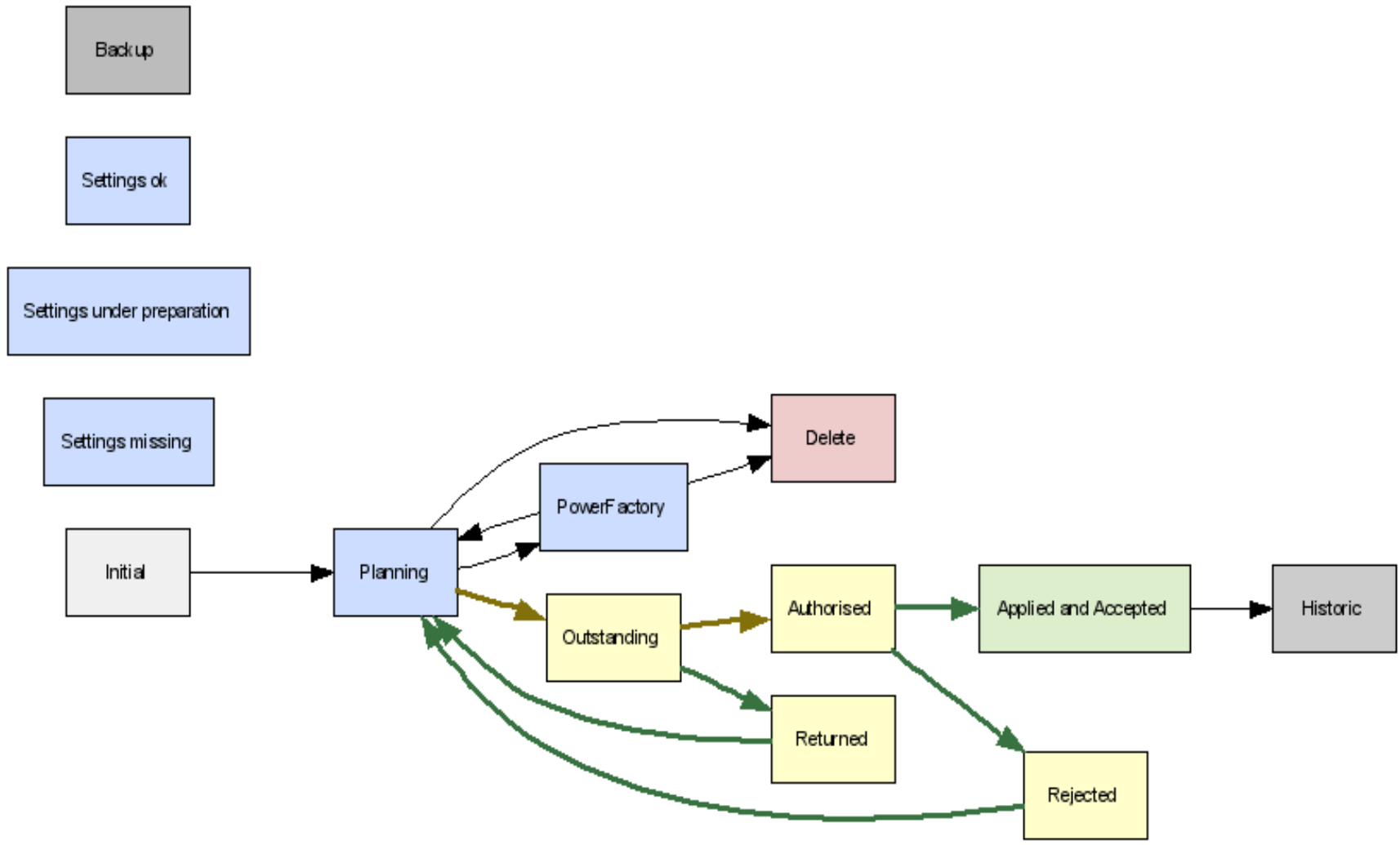
Settings Lifecycle

- The settings lifecycle is the workflow sequence of protection settings from inception through planning until it is implemented.





Settings Lifecycle





User Management

- Users are given access passwords to control system security
- Users are assigned data access and functional rights depending on their responsibility. User groups were created to manage the different types of responsibilities.
- 5 User Groups:
 - Administrators
 - Settings Engineers
 - Head of Settings
 - Field Technicians
 - Read only



Migration Converter

- City Power's existing settings had to be migrated from the existing spreadsheet to the new PSMS
- This was done by formatting City Power's spreadsheet into a complete uniform format
- A small application (import converter) was then developed to read in parameters from the spreadsheet into the new PSMS.
- The import converter created:
 - Location Structure (Areas, Substations, Bays)
 - Devices with settings (as per spreadsheet)





Devices

- The new PSMS at City Power has an extensive Relay library
- If a relay or device is not available, it can be created through a XML file
- ‘Generic’ devices were created to capture settings as per the original City Power spreadsheet
- Detailed Relay Configuration files were imported where it was available, for e.g. SEL Quickset files etc.



Full Document Management

- Additional Documents allows for all the documents relating to protection settings to be stored in one place
 - Incident Reports
 - Test Reports
 - Bay diagrams etc
- Standard PDF or HTML reports available on the PSMS



Conclusion

- Old hap-hazard spreadsheet of City Power replaced with modern centralised protection settings management system
- The new PSMS has a friendly web interface and easy to follow system hierarchy for quick data access
- Workflow sequence enforced through a lifecycle that provides a full audit trail and no communication breakdown
- Data access controlled through user groups with specific access rights
- Existing settings migrated to new PSMS
- Full document management and automated reports



Thank You

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