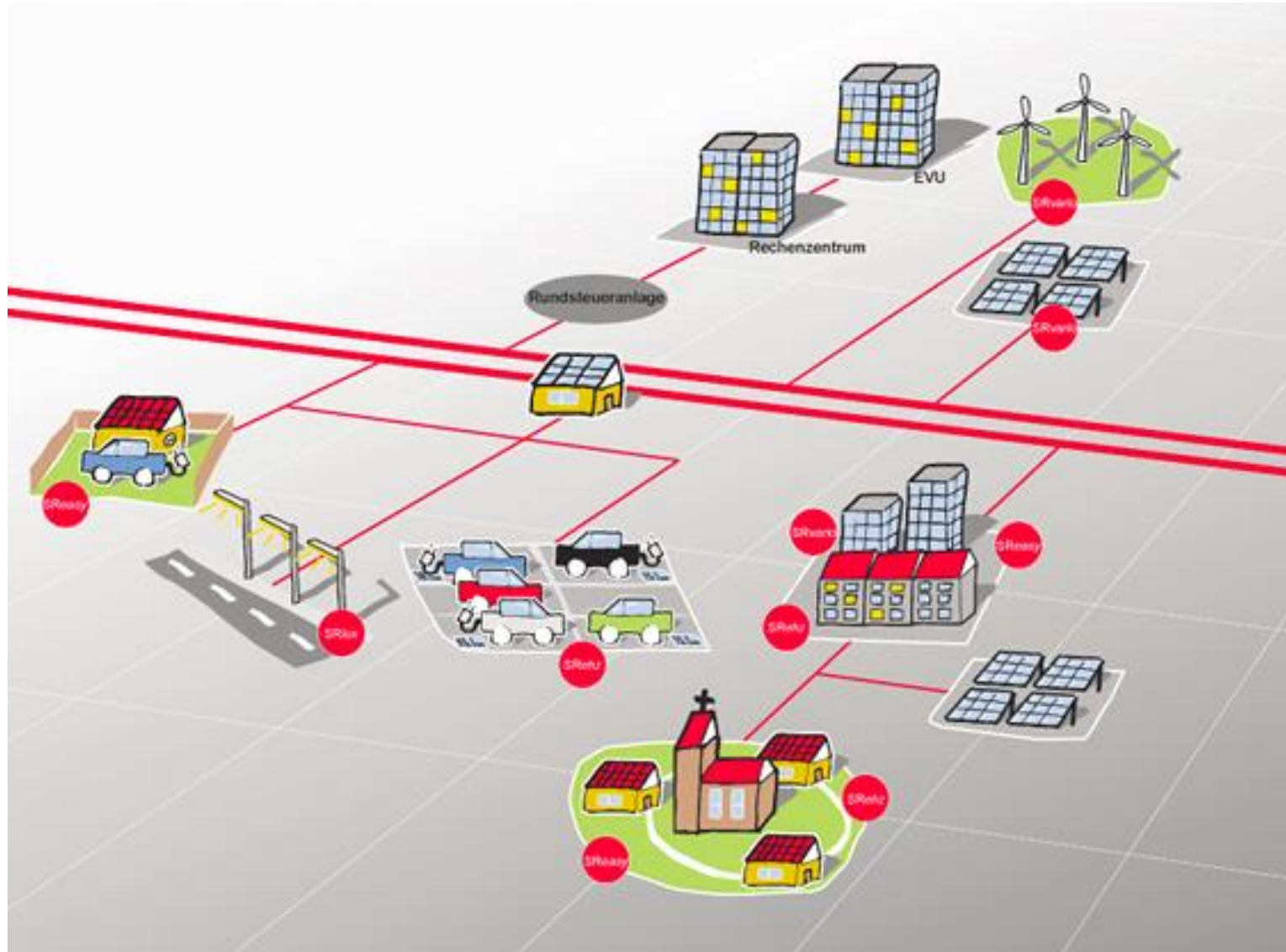




Swistra Protocol

Ripple Control for the 21st Century's Smart Grid

Swistra Ripple Control for the 21st Century's Smart Grid



- Compatible with existing telegrams
- Address receivers individually
- Remote group programming
- Single receiver can accept multiple commands for load shedding
- Special purpose receivers for AS4755 DRED (Demand Response Enabling Devices)

Cost effective, smart management of peak demand

Utilizing existing proven technology?

Within parts of Australia and New Zealand , we are fortunate enough to have a large proven based technology, that has been controlling peak demands for many years through older conventional water heaters, called **Ripple Control** or **Audio Frequency Injection Control Equipment**.

This proven, older based technology, has evolved over the years and is still being used on greenfield sites globally for controlling peak demand in much smarter forms.

The distinct advantage is that with a little bit of tweaking of the existing system, Power Utilities could use there existing ripple control equipment, for peak demand management for (DREDs) Demand Response Enabling Devices using a simple structured Decabit or Semagyr Code. Giving peak demand load control back to power utilities as Energy QLD have demonstrated, though the Peak Smart incentive by Energex for example,

<https://www.energex.com.au/home/control-your-energy/cashback-rewards-program/cashback-rewards-for-households/air-conditioning-rewards> which has proven to be extremely reliable and successful.

You can further enhance this technology down to demand management of individual distribution substation level, and load group type in accordance with such AS4755.3 with the implementation of Swistra in conjunction with your existing ripple control equipment, for any new installed receivers.

Ripple Control is proven means to demand management, Swistra Protocol is a proven advanced protocol capable of controlling existing controlled loads (hot water etc.) as well as future loads (AS4755 DREDs, Electric Vehicles, Battery Storage etc.) in much more sophisticated way.

Implementation of Swistra, in comparison to the older Decabit or Semagyr has many other benefits other than simple control of DRED AS4755.3 compliant devices once implemented and can be used in conjunction with existing Decabit or Semagyr signals

Swistra Explained

What is Swistra?

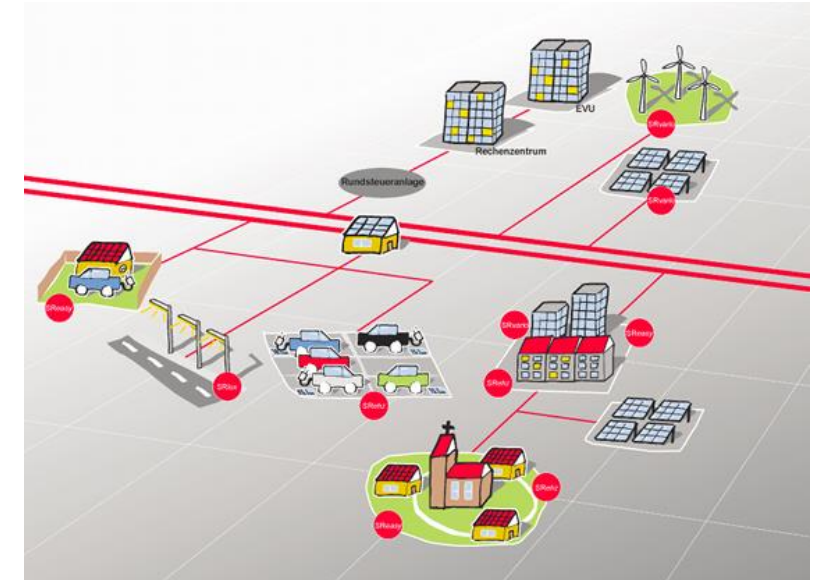
- Swistra is a completely new developed transmission method.
- Swistra is an evolution for an existing Ripple Control system.
- Swistra is a byte pattern composed of a command byte and three address bytes.
- Swistra is backward compatible with known Ripple Control telegrams.
- Swistra is the Ripple Control of the 21st Century.

Why switch to Swistra?

- Swistra has higher data rate than other bit patterns.
- Swistra has shorter telegram runtimes than other bit patterns.
- Swistra has a very large address space.
- Swistra can address each recipient on its serial number individually.
- Swistra can be used without a conversion phase.

Swistra – flexible control!

- With Swistra loads and generators can be controlled with a customizable group address structure, for example according to minisubs. Moreover each Swistra receiver can be controlled individually. The group assignment can be reprogrammed with a dedicated Swistra command via a Ripple Control transmission
- *Swistra can be used in conjunction with existing Decabit or Semagyr Signals*



Swistra Explained

Swistra – how do I change?

- Upgrade the control system. Swistec RKS-controllers only need a firmware update to achieve this.
- Most static transmitters can be retained. Rotating transmitters need to be replaced (e.g. with a Swistec SRS-3xxx transmitter).
- Installation of receivers for the desired new tasks.

Swistra – what remains the same?

- Compliant and compatible with all existing Ripple Control systems / bit patterns.
- Using the same frequency as the existing Ripple Control system.
- Using the same coupling cells as the existing Ripple Control system.
- Most static transmitters can be retained. Rotating transmitters need to be replaced (e.g. with a Swistec SRS-3xxx transmitter).
- Using all existing receivers in a mixed mode.

Swistra – receivers from Swistec

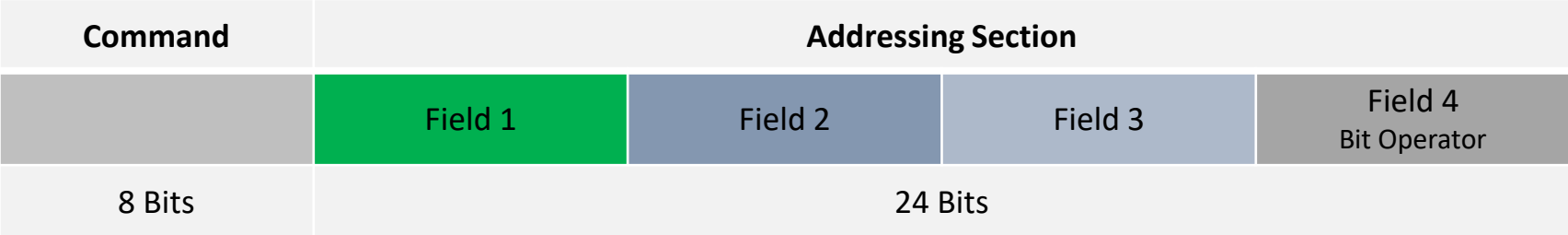
- All Swistec ripple control receivers use state-of-the-art, recently developed filter algorithms capable of reliably processing ripple control signals with operating voltages below 0.3% U_n – a result of state-of-the-art processor technology combining high CPU power with little power consumption.



Swistra Protocol

How it works

Swistra has a layered addressing structure made up of a 4 byte signal. The first byte is the command signal and is fixed to 8 bits. The remaining 24 bits make up the addressing portion of the signal and can be customised to utilities requirements. The Address portion is made up of 4 segments as standard (which can be further customised), the last segment has a bit-wise operator to allow for multiple group operations in the one signal ***and can be used in conjunction with existing Decabit or Semagyr signals***



Swistra Commands Suggested Architecture for DRED

The Swistra protocol command library includes simple on/off commands of ripple relays as provided today, plus and all AS4755 Operational Instruction Demand Response Modes (DRM) to allow for the operation of all current and future AS4755 compliant Demand Response Enabled Devices (DRED).

There are eight DRM modes which are included in existing AS4755.3 standards.

The Below is the matrix showing which DRM modes are achievable under each AS4755.3 standard.

	AS4755.3.1 Air Conditioning	AS4755.3.2 Pool Pumps	AS4755.3.3 Water Heater	AS4755.3.4 Electric Vehicles	AS4755.3.5 Battery Storage	AS47777.2 Inverters
DRM1	X	X	x	X	X	X
DRM2	X	X	X	X	X	X
DRM3	X		X	X	X	X
DRM4		x	X	X	X	X
DRM5				X	X	X
DRM6				X	X	X
DRM6				X	X	X
DRM7				X	X	X
DRM8				x	x	x

Commands required to standard include
1. AS4755.3 DRM1
2. AS4755.3 DRM2
3. AS4755.3 DRM3
4. AS4755.3 DRM4
5. AS4755.3 DRM5
6. AS4755.3 DRM6
7. AS4755.3 DRM7
8. AS4755.3 DRM8
9. Close Contactor (On)
10. Open Contactor (Off)

Load groups 1, 2, 3, 4, 5 and 6 are controlled via the deployment of the appropriate DRM commands as specified in the AS4755 standards and load groups 7 and 8 can be controlled via on/off commands.

All relays and DREDs devices can be individually addressable to allow for operation of specific customer loads.

Swistra Ripple Single – From zone sub

Injection at the Zone Sub

The majority of AFIC injection is performed at the Zone Substations busbar.

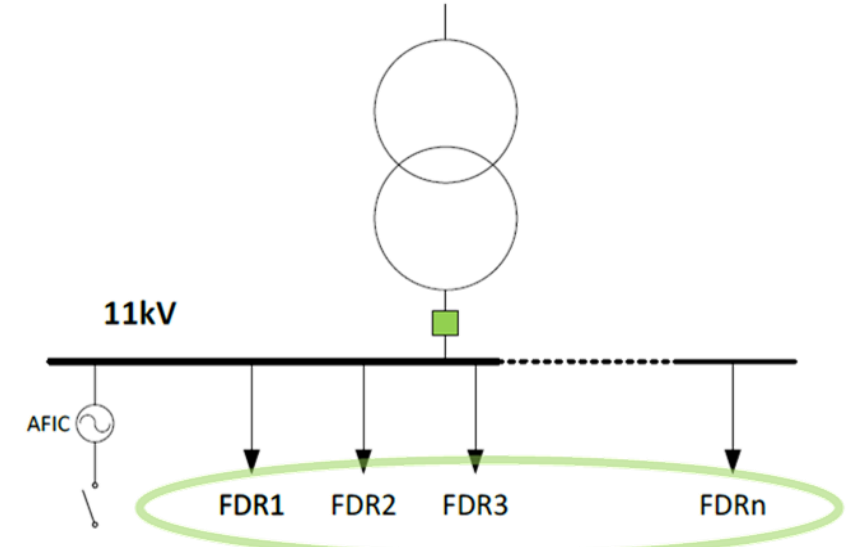
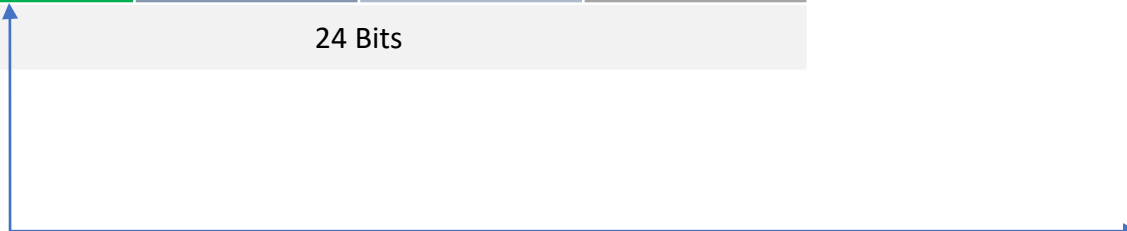
There are minimal requirements to developing the Swistra Mapping. The Swistra addressing at the Zone Substation level allows for targeted deployment of AS4755.3 DRM commands at the zone, feeder and distribution substation level.

This is achieved by allocating an addressing field to the feeders, to the distribution substations connected to that feeder, and designing a broadcast signal into both fields.

A wide scale Zone Substation deployment can be performed by sending the broadcast signal in both the feeder and distribution substation fields, and feeder level deployment connections send the broadcast to all distribution substations connected to that feeder.

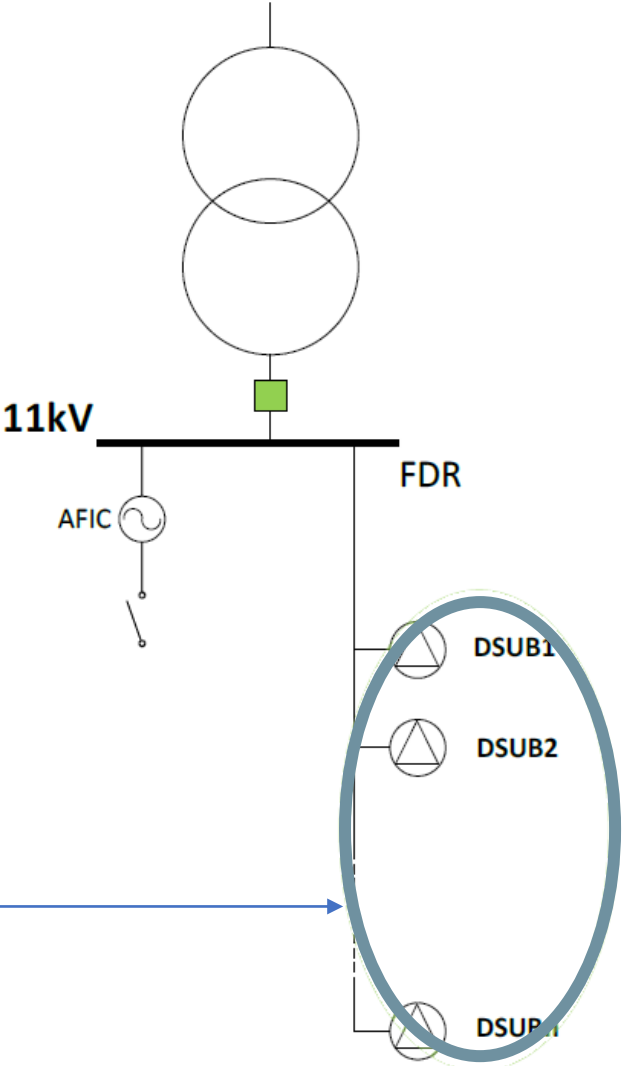
Then allowing for further control of each load group, and the action you would like to take on that load group, whether it is a simple on/off command, or trimming of load in incremental values (load shedding).

Command	Addressing Section			
	11kV Feeder	Distribution Substation	Load Group	Sub Group
8 Bits	24 Bits			

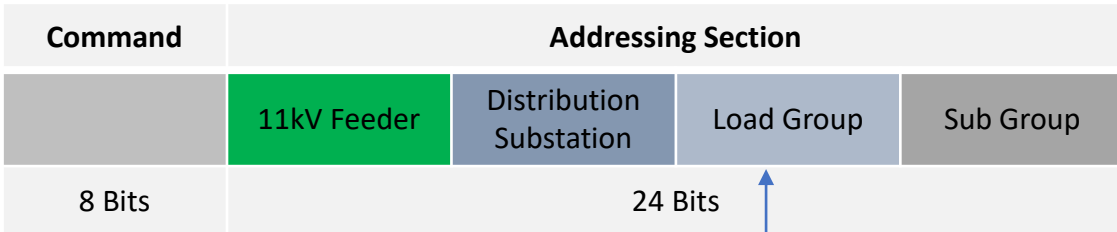


Swistra Ripple Single – From zone sub (Common application)

Command	Addressing Section			
	11kV Feeder	Distribution Substation	Load Group	Sub Group
8 Bits	24 Bits			



Swistra AFIC – From zone sub (Common application)



Examples of Load Group Layer

This field should be dedicated to the load group that the relay belongs to.

Examples groups include:

- 11. Air Conditioning (AS4755.3.1)
- 12. Pool Pumps (AS4755.3.2)
- 13. Water Heaters (AS4755.3.3)
- 14. Electric Vehicles (AS4755.3.4)
- 15. Generator Inverters (4777.2)
- 16. Battery Storage (Future)
- 17. Controlled Load 1
- 18. Controlled Load 2
- 19. Streetlights
- 20. Non-Group

Non Group can be used to assign customer DREDs that are not on a DM program. Customers that are enrolled in DM programs **which opt out of scheduled events will be temporarily moved to the Non-Group for the duration of the event, and then moved back to the original group.**)

Examples of Possible Sub Group Layers

Examples Sub Groups.

11. Air Conditioning (AS4755.3.1)

- 1. Less than 3kW (DRM1 fixed)
- 2. More than 3kW (DRM1 fixed)
- 3. Less than 3kW (DRM1,2,3 connected)
- 4. More than 3kW (DRM1,2,3 connected)

17. Controlled Load 1

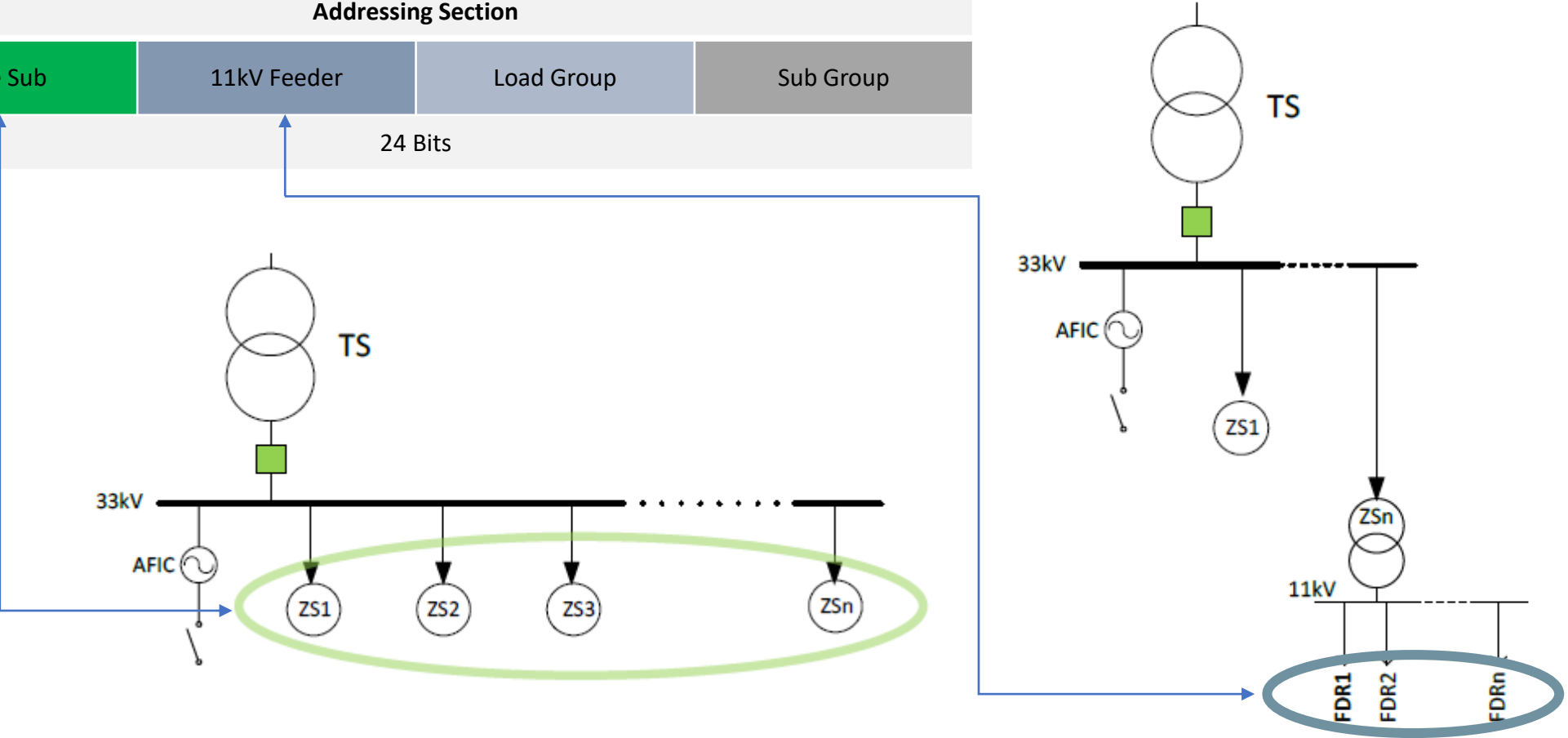
- 1. 22:00-13:00
- 2. 22:00-07:00
- 3. 23:00-07:00
- 4. 00:00-07:00
- 5. 00:30-07:00
- 6. 01:00-07:00
- 7. 01:30-07:00
- 8. Other

Swistra Ripple Single – Less Common Transmission Sub

Injection at the Transmission Sub

Even at the less common transmission level Injection, Swistra still is able to provide control at an individual feeder level and is capable of targeted approach to controlling peak demands.

Command	Addressing Section			
	Zone Sub	11kV Feeder	Load Group	Sub Group
8 Bits	24 Bits			



Advantages Managing Peak Demand with Swistra.

- ✓ **Proven Reliable Technology**
- ✓ **Maximum utilisation of existing assets**
- ✓ **Complete control**
- ✓ **Low cost to implement and maintain**



THANK YOU.



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