NRS049 - Advanced metering infrastructure (AMI)

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Industry Association Resource Centre

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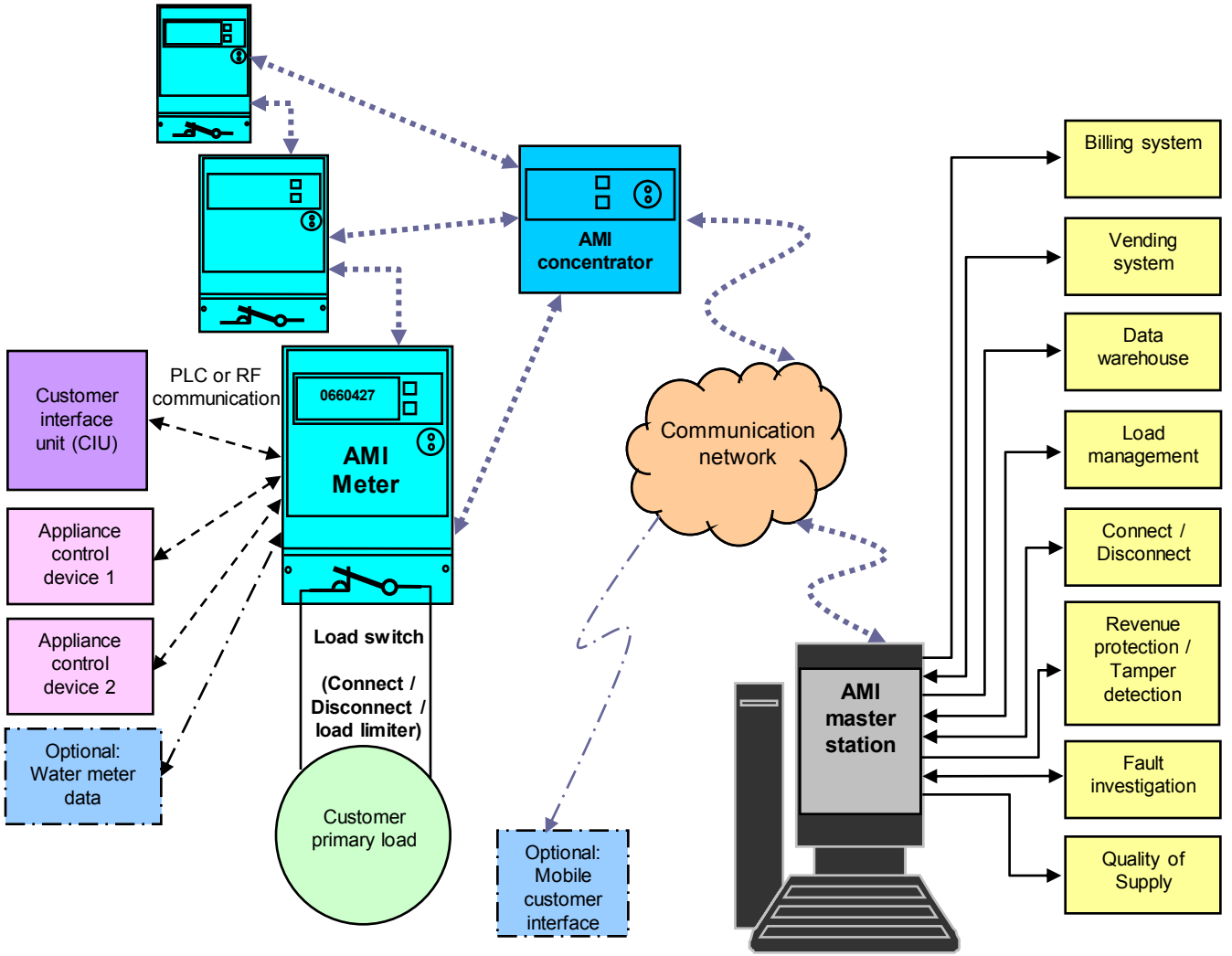
NRS 049 explained

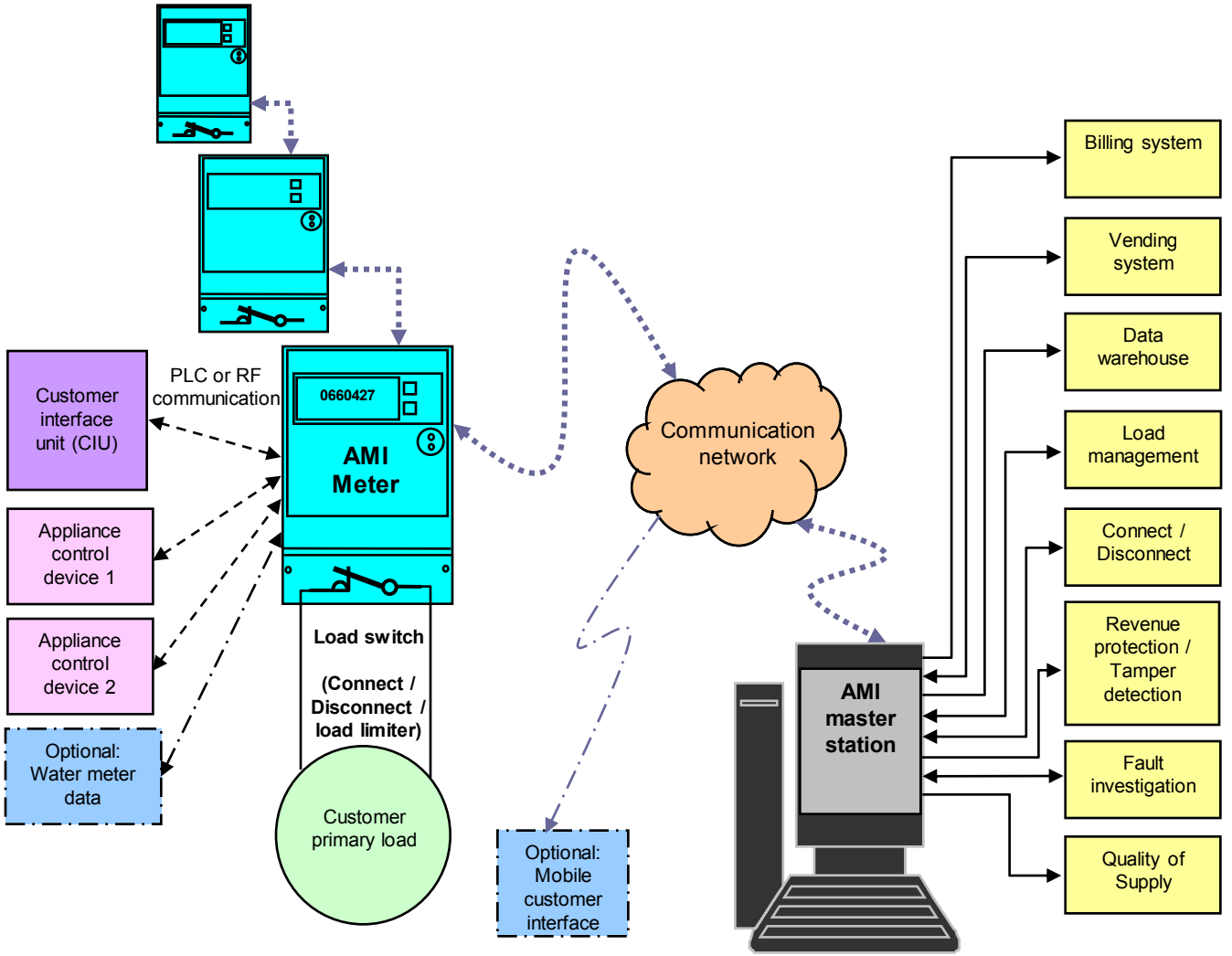
Residential time-of use tariffs, demand side management, load limiting, customer electricity usage education…

These are all concepts which have been specified in NRS049 to ensure standardisation of AMI systems being implemented by electricity supply utilities in South Africa.

AMI system


AMI concentrator
Billing system
Vending system
Data warehouse
Load management
Connect / Disconnect
Revenue protection / Tamper detection
Fault investigation
Quality of Supply
Customer interface unit (CIU)
PLC or RF communication
0660427
AMI Meter
Communication network
Appliance control device 1
Appliance control device 2
Optional: Water meter data
Load switch
(Connect / Disconnect / load limiter)
Customer primary load
Optional: Mobile customer interface
AMI master station

AMI system: Alternative



What is covered by NRS049?

Overview of the system
Functional requirements of each component
Communication standards
Functional requirements for the master station
Mechanical and climatic requirements
Electrical requirements
Software requirements
Performance levels
Test requirements
Training

AMI system components: Meter

Main component of the AMI functionality at customer installation

- Active energy measurement – class 1
- Time of use metering data
- Event data capturing (QOS, status…)
- Control of the appliance control devices
- Cater for connect/disconnect
- Cater for supply capacity control (load limiting)
- Communication hub to customer interface unit
- Communication to concentrator / master station

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AMI system components: Customer interface unit

Situated within customer's premises

Communication from / to meter - PLC or RF

Information to the customer:

- Billing information
- Status on:
  - Time of use active periods
  - Appliance control devices
  - Supply capacity control
- Utility messaging:
  - National demand status
  - Impending disconnect (non payment)

AMI system components: Appliance control devices

Situated within customer's premises at the appliances

Communication from / to meter - PLC or RF

Appliance controlled from meter

- According to TOU schedule
- On-demand from utility

AMI system components: Master station

Interface to field equipment

- Data retrieval
- On-demand appliance control
- On-demand supply capacity control
- Customer messaging
- Connect / disconnect

Interface to utility support systems

- Billing system & data warehouse
- Load management
- Revenue protection system
- Vending systems
- Fault investigation system
- Quality of supply system

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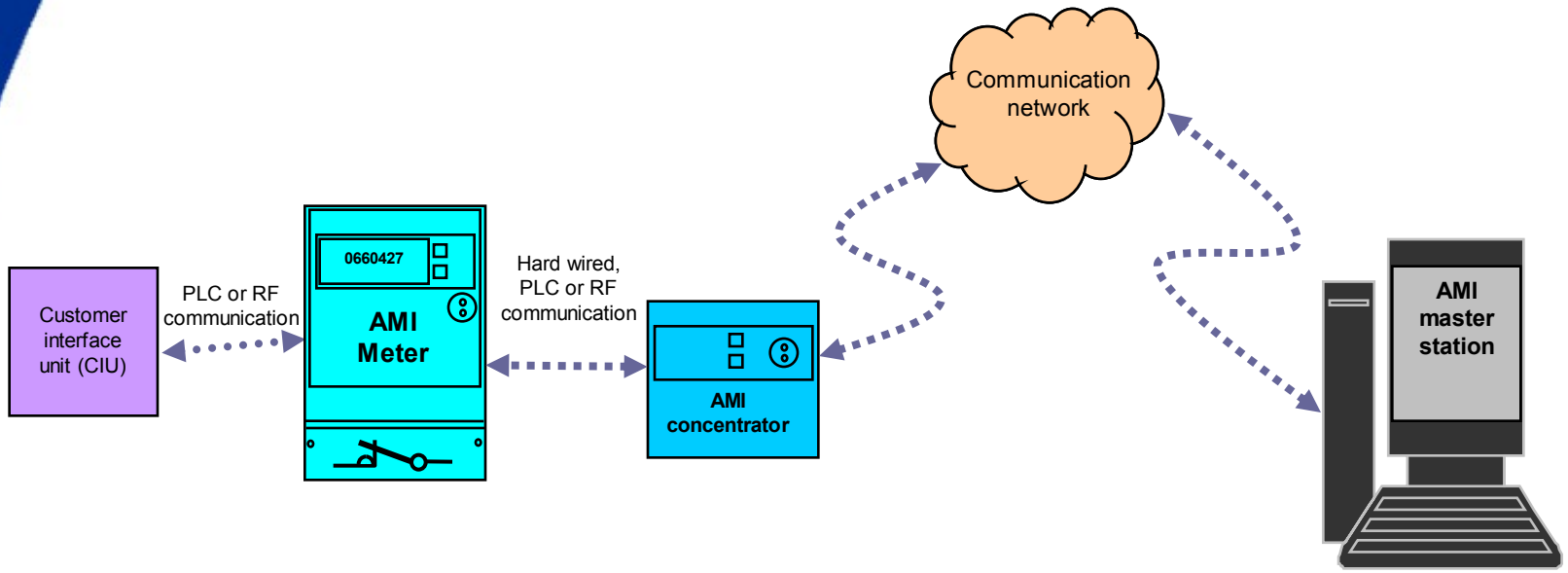
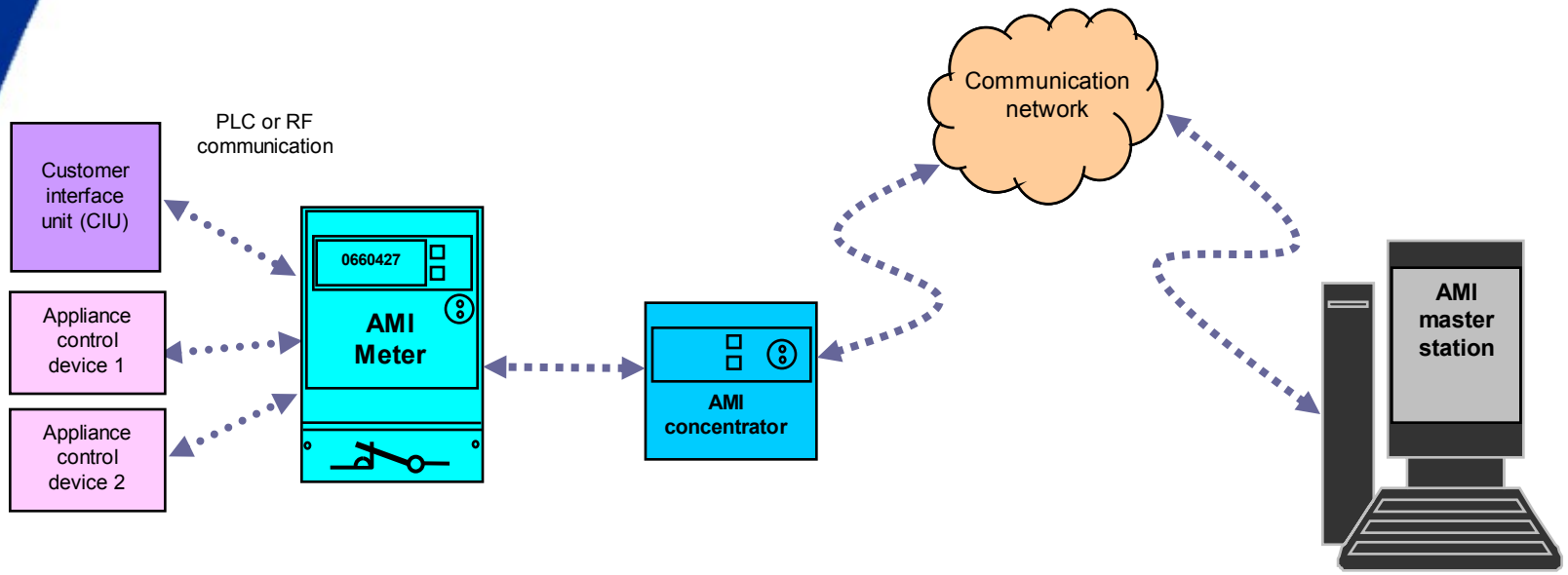
AMI system functionality: Meter reading



- Automatic meter reading from master station
- On-demand meter reads from master station
- Master station integrates to utility billing systems
- Customer have access to meter reading information through customer interface unit

AMI system functionality: Appliance control



- Normal operation controlled through switching sequence on meter
  - Help utility to move load out of peak periods
  - Help customer to move load out of peak periods – cost saving
- On-demand appliance control from master station

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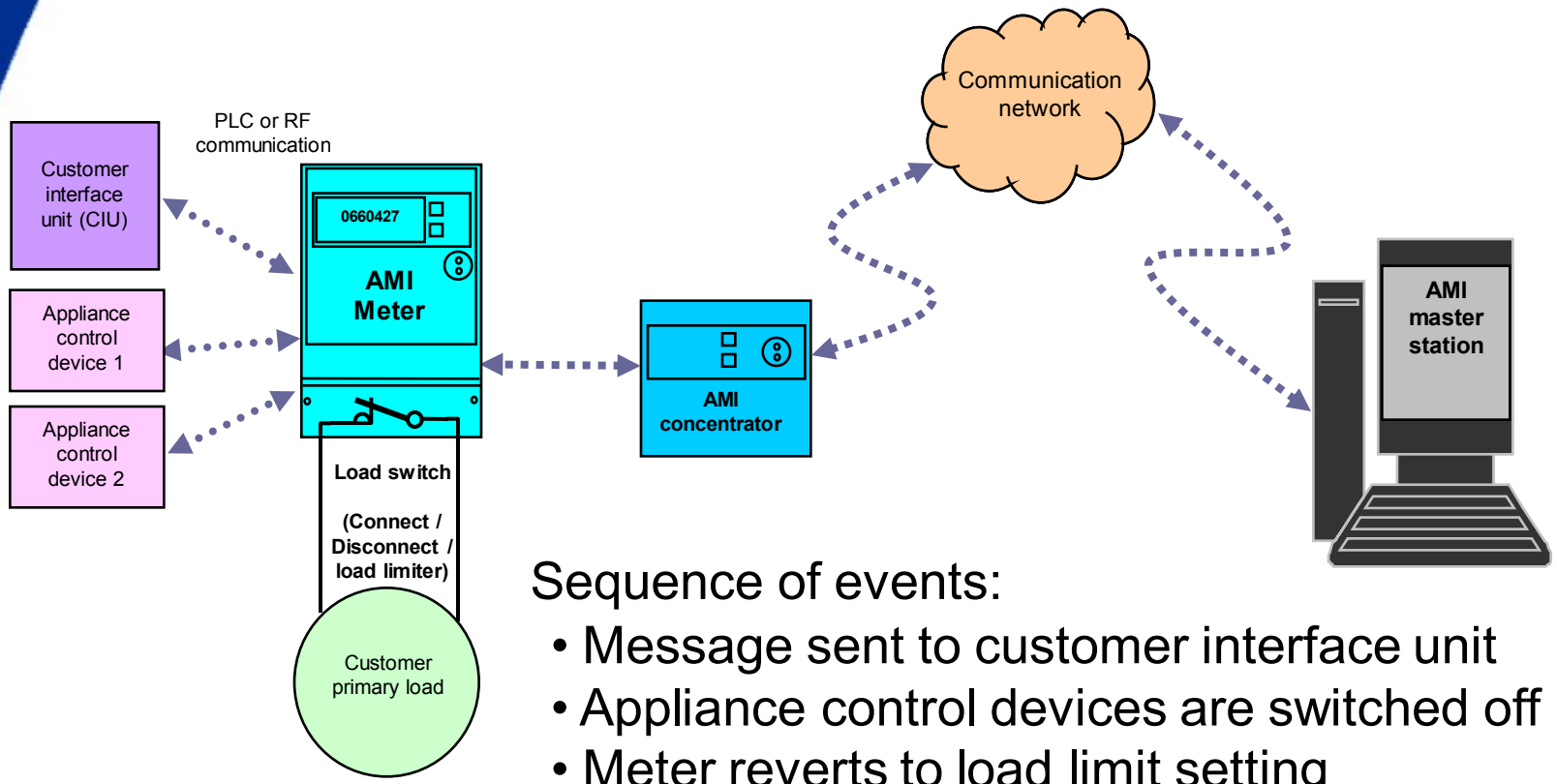
AMI system functionality: Appliance control

- Master station supports appliance control groupings
- Switching back:
  - Time offset configurable for groupings plus
  - Randomised switch back time determined by meter
- Status of devices to be shown through customer interface unit

AMI system functionality: Supply capacity control



Sequence of events:

- Message sent to customer interface unit
- Appliance control devices are switched off
- Meter reverts to load limit setting
- Meter monitors load for predetermined time
- Load > setting = customer is switched off
- Customer switched on after elapsed time
- Repeat of sequence

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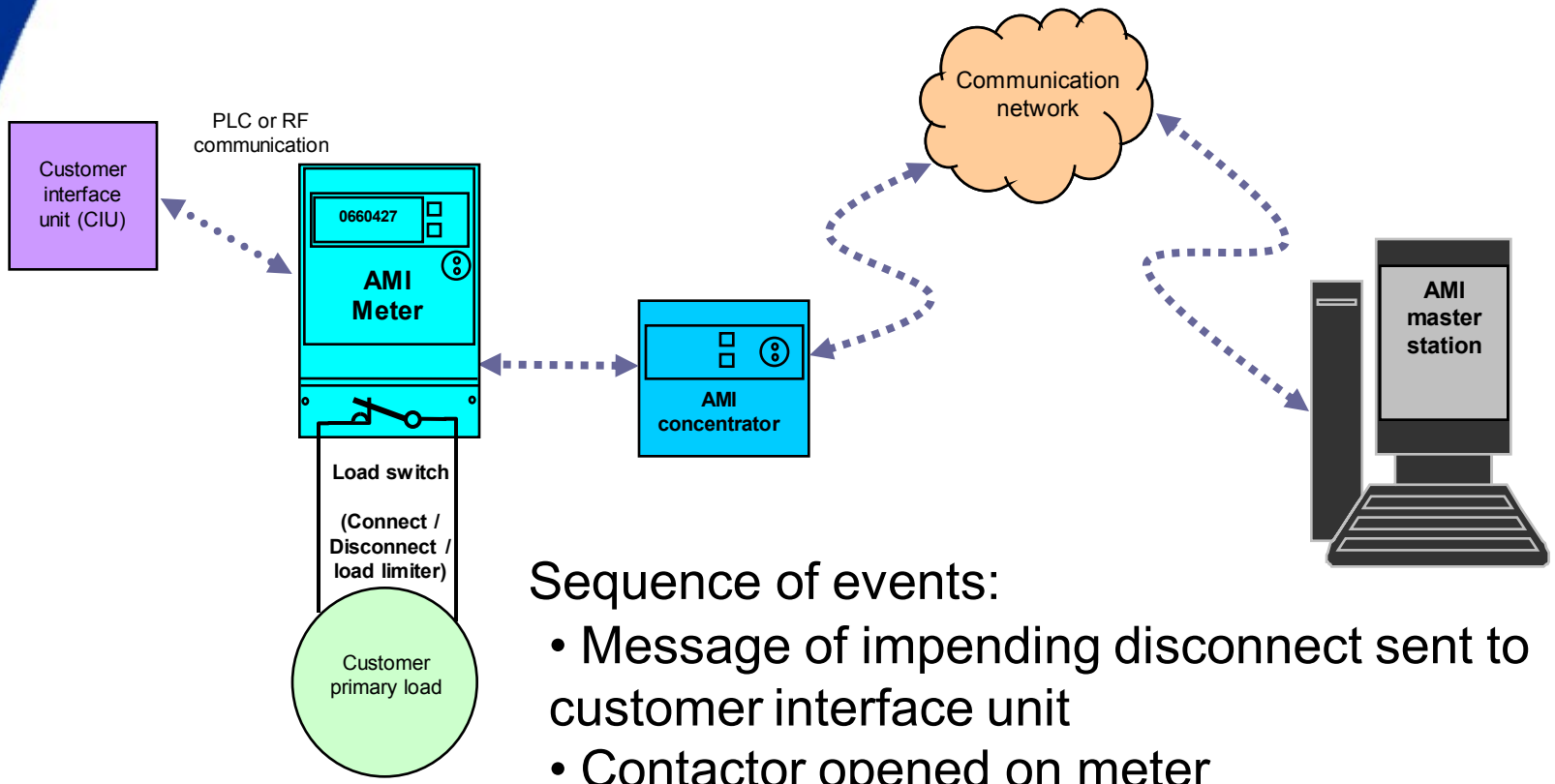
AMI system functionality: Supply capacity control

- Normal supply capacity control according to switching sequence on meter
- On-demand from master station – lower setting
- Switching back:
  - Time offset configurable for groupings plus
  - Randomised switch back time determined by meter
- Status of limit and appliance control devices to be shown through customer interface unit

AMI system functionality: Connect / disconnect



Sequence of events:

- Message of impending disconnect sent to customer interface unit
- Contactor opened on meter
- Customer disconnected

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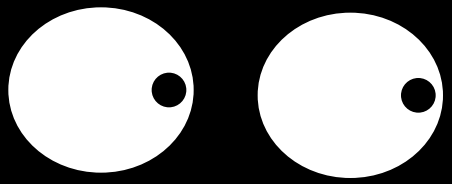


AMI system functionality: Under frequency supply control

Under frequency control (optional)

- Meter act independently (no master station intervention)
- Frequency lower as setting
- Meter operates the appliance control devices
- Supply capacity control can also be activated
- Switch back sequence as previous

AMI system functionality: Prepayment

Prepayment may function differently than conventional prepayment meters

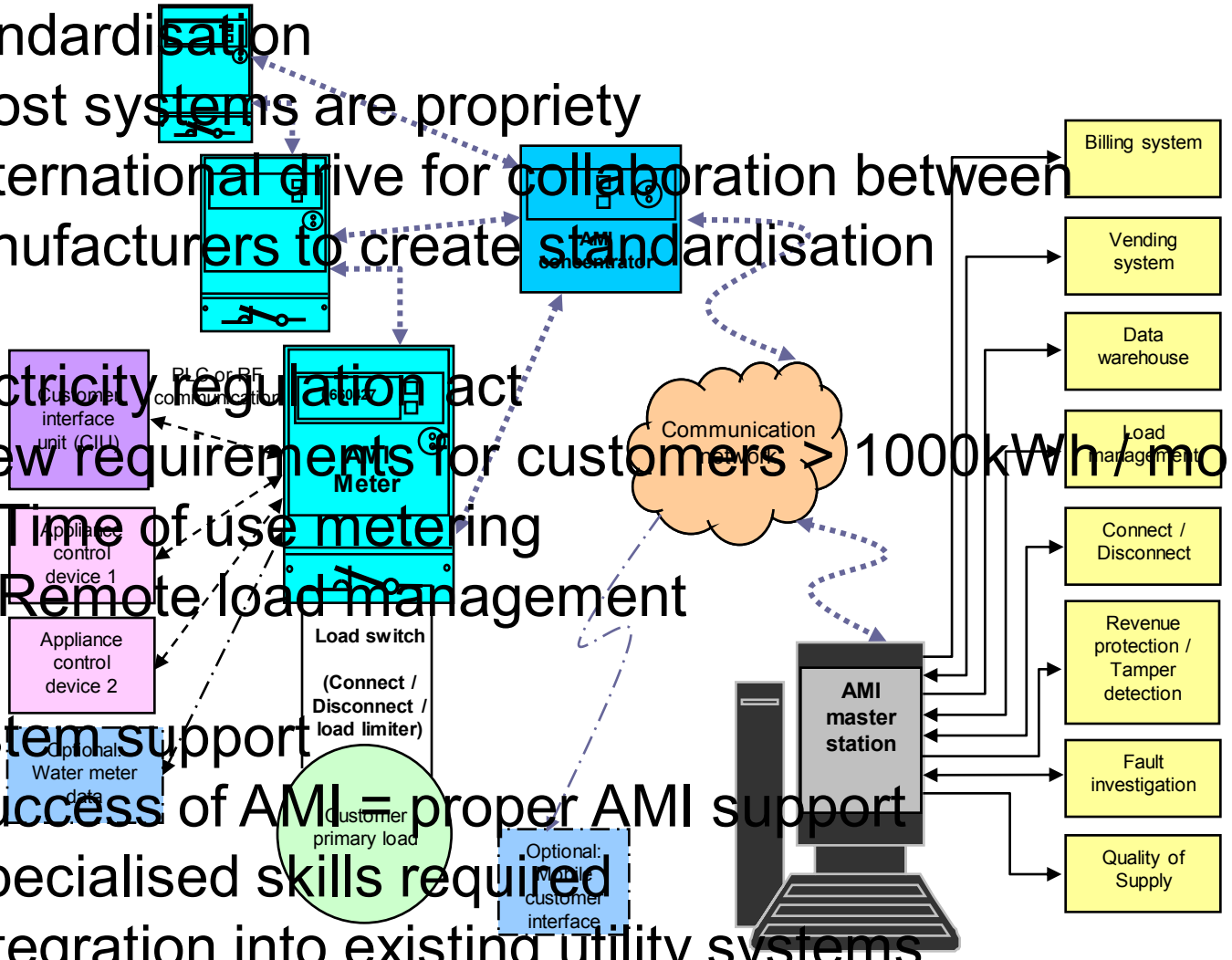
- Disconnect controlled by the AMI master station
- Messaging from master station to customer on impending disconnect due to low credit
- Disconnect / reconnect customer

AMI challenges

Standardisation
- Most systems are propriety
- International drive for collaboration between manufacturers to create standardisation

Electricity regulation act
- New requirements for customers > 1000kWh / month
  - Time of use metering
  - Remote load management

System support
- Success of AMI = proper AMI support
- Specialised skills required
- Integration into existing utility systems



AMI – Next steps

NRS049

- Published as first release in September 2008
- May form the basis of utility AMI

Evaluation of AMI systems

- Proper evaluation to be done on available systems
- Some functionality may be new in the world
- Accelerated life cycle testing
- Large scale pilot projects
- Evaluate systems support

Conclusion

NRS049 – Advanced metering infrastructure for residential and commercial customers

A first initiative for the ongoing challenge on standardisation on AMI in South Africa

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