Updating Your Legacy C&I Data Collection System

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elster
Vital Connections

Agenda

- Company Overview
- C&I data collection history
- Current situation
- Characteristics of a modern system
- Extending the solution to the endpoints
- Q&A

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Global leadership

GAS	WATER	ELECTRICITY	NORTH AMERICA
#1	#1	#3	#1
global meter market share	global meter market share	global meter market share	in number of AMI systems

Global leadership positions across all Smart Grid segments and end-markets (residential, C&I and T&D)

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Proven, trusted Smart Grid solutions

GLOBAL REACH

ANNUAL REVENUES: ~$2B

Operations in 39 countries, customers in >100 countries

175+ YEARS DELIVERING TRUSTED SOLUTIONS

OVER 100 SMART GRID SYSTEMS

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Elster EnergyICT overview

- Founded in 1991
- Acquired by the Elster Group in October 2009
- Software, hardware, and implementation services
- Over 400 systems installed:
  - Multi-Vendor Data Acquisition System – IMServ, HEC, US Navy, TriMark, Enexis
  - Meter data management – DTE Energy, Salt River Project, OG&E, Hydro Quebec
  - Energy Management – Wal-Mart, Tesco, Sainsbury, DOL, ASDA, Migros, Carrefour
  - Energy Service Companies – British Gas Business, NPower, EnergyConnect
- Focused on providing advanced energy data collection and processing systems to utilities and their customers

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History "First Generation"

- Visual readings
  - Energy and demand
  - Chart recorders
- Requirement for interval data for C&I billing and load research drives development of pulse output meters and magnetic tape recorders
- Mainframe systems required for processing
- Ed White starts up Utility Translation Services (UTS) for mag-tape translation to engineering units for customer billing and load research

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History "Second Generation"

- Magnetic tape recorders replaced by solid state data loggers
  - Schlumberger DataStar, GE DR-87,PSI S100/200, Aptech 801
- Dedicated PSTN or shared customer lines used for remote communications
- Hand held computers with optical ports used for manual reading
- Pulse counting with snapshot encoder register readings still the norm
- UTS launches first multi-vendor meter data collection system in late 80s

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History "Third Generation"

- Meter manufacturers develop "under the glass" data loggers into solid state metering devices
- PSTN, hand held devices, and external analog cell phones used for data collection
- Basic interval data collection technology still focuses on counting pulses and translating data
- Walk-by, drive-by, and fixed network AMR

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History "Third Generation"

- Key roles of legacy data collection system:
  - Multi-Vendor data collection
  - Raw data to engineer unit data conversion
  - Validation, estimation, and editing
  - Totalization
  - Reporting
  - Data transfer
    - Customer billing
    - Load research/forecasting
    - Load settlement
    - Distribution planning
- Legacy system typically administered by business users

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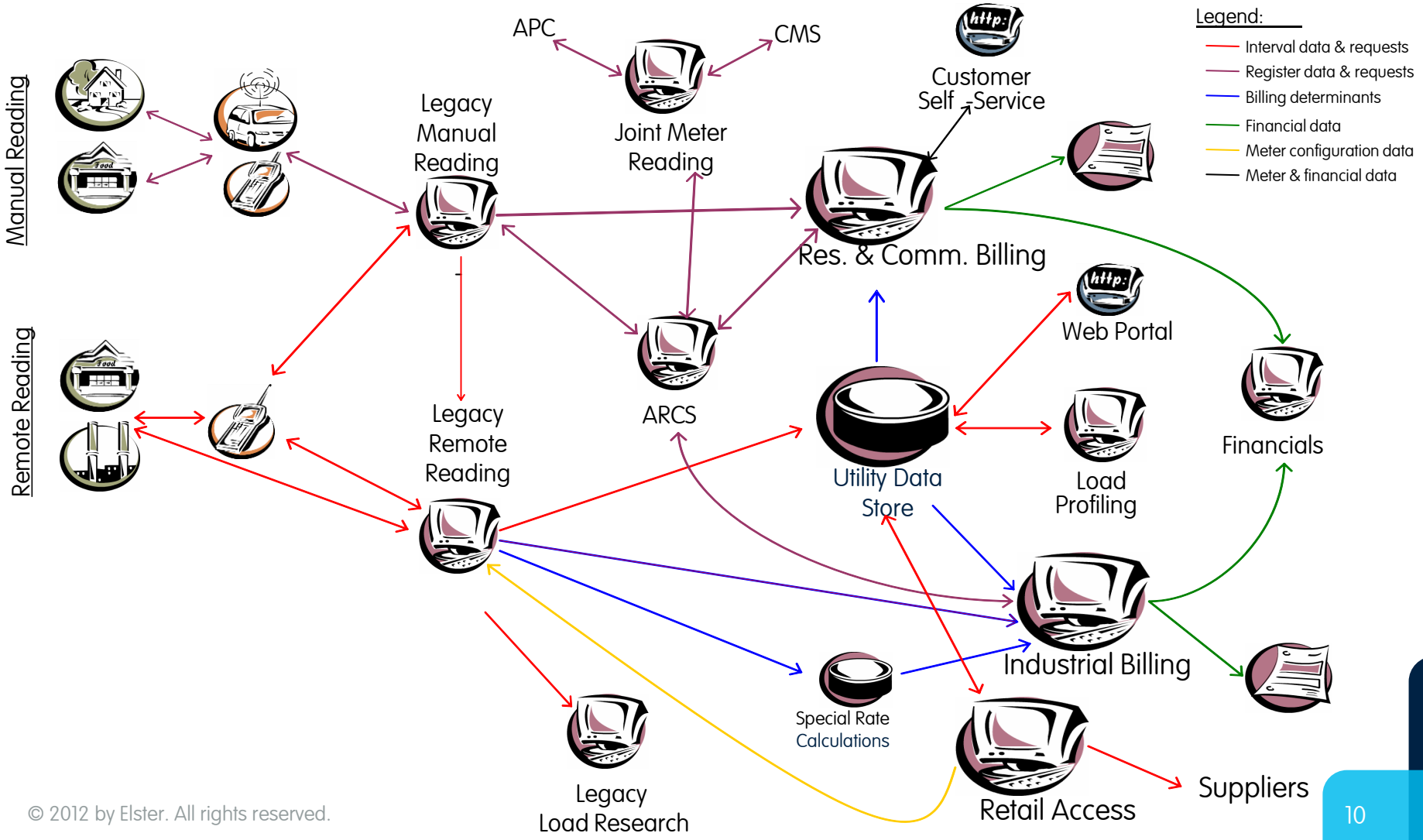
Meter data flow pre-AMI



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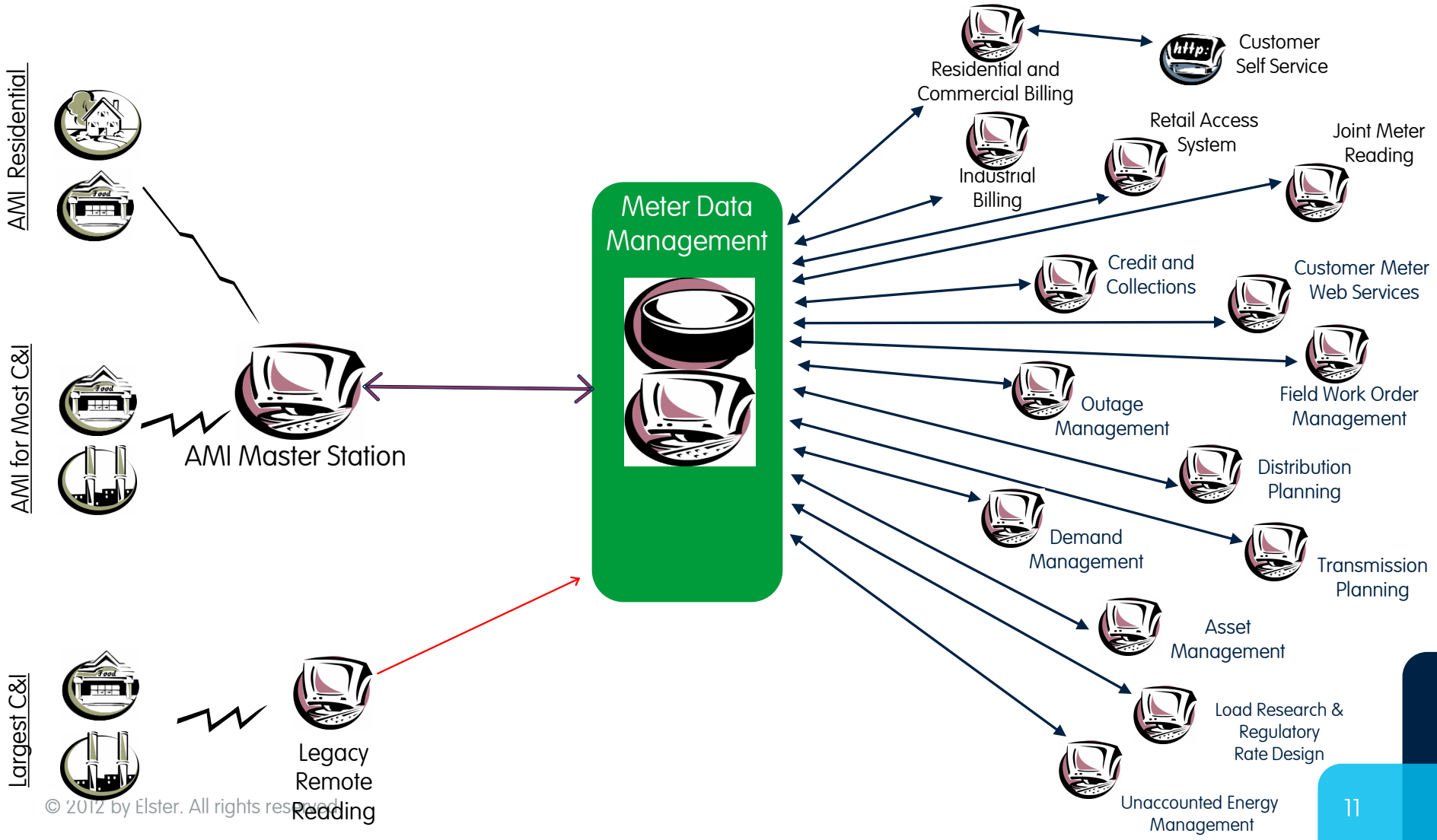
Meter data flow typical MDM RFP requirements



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Current situation

- Today's AMI systems meet the requirements for most C&I loads, but the largest C&I accounts are typically still managed with a separate legacy point-to-point communication solution
- Requirements of largest C&I accounts
  - High frequency data collection
  - High resolution interval length
  - High connection reliability
  - Complex metrology requirements
  - High number of channels of data logged
  - Numerous brands of existing metering devices (different protocols)
- Current C&I legacy system used by most utilities does not meet modern security or utility IT standards
- Up to 40% of utility's revenue may flow through a legacy system

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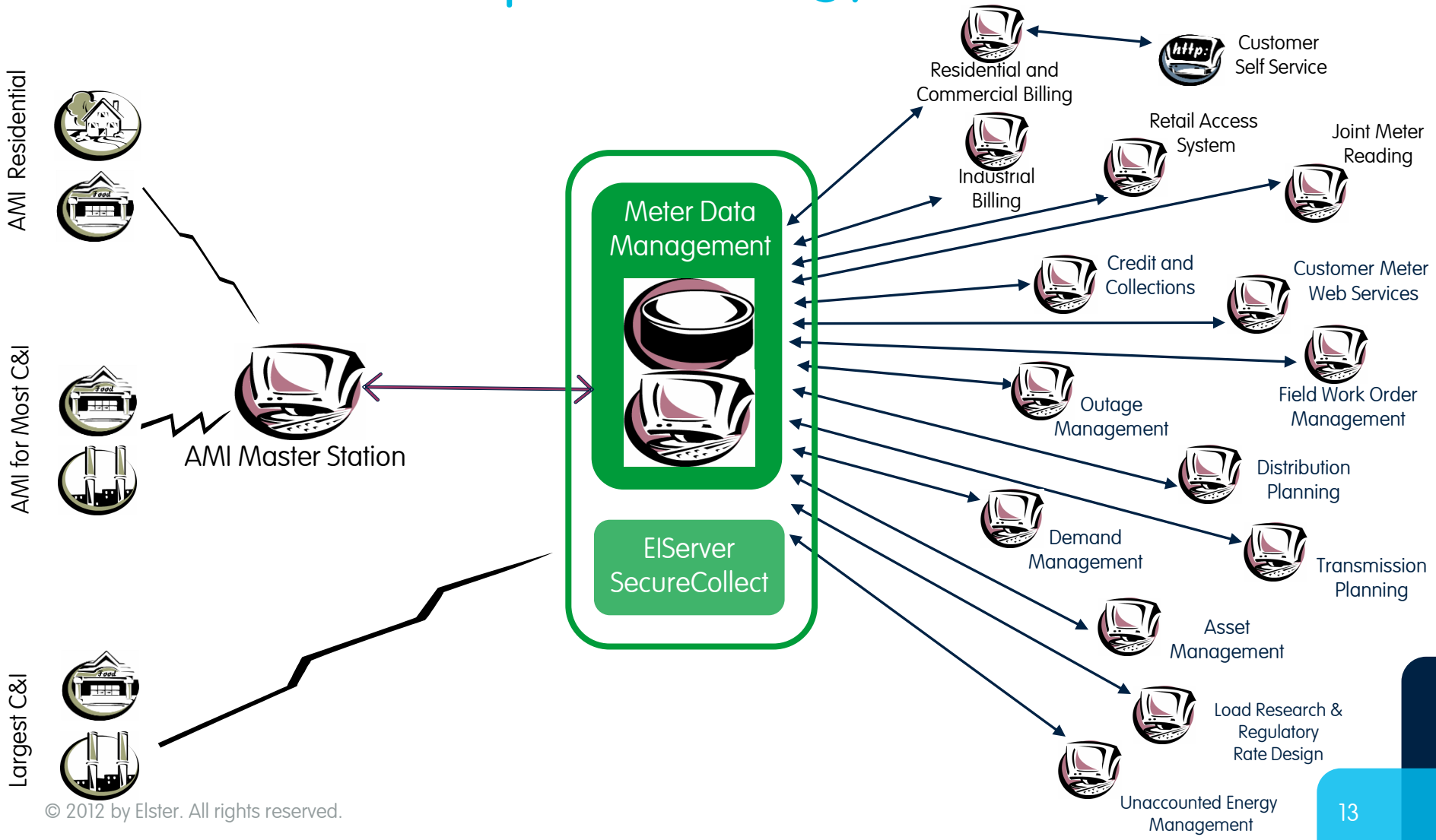
Meter data flow | Elster EnergyICT solution



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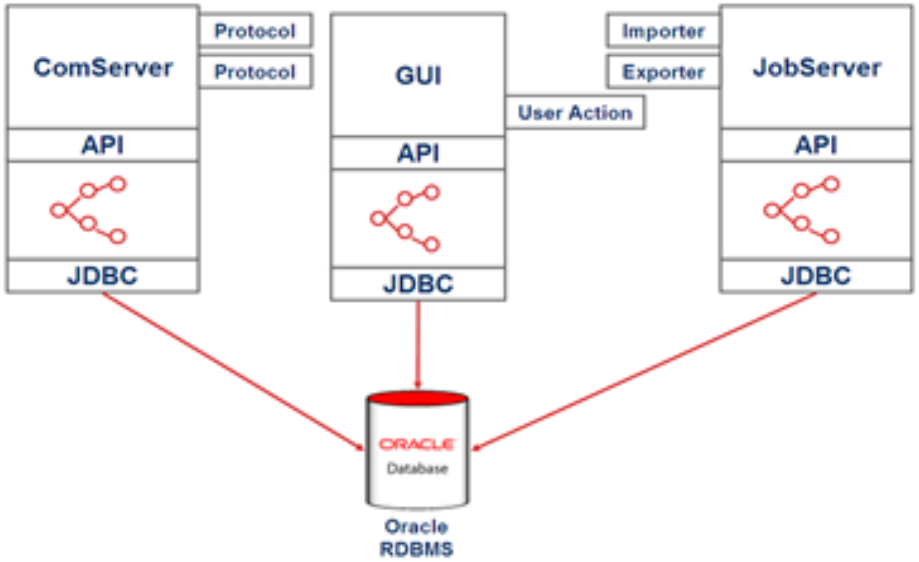
Characteristics of modern data collection system

- Built on standard relational database platform using CIM compliant data structure



- Supports modern web service interfaces for:
  - Master data synchronization
  - External calls from external systems
  - Data transfers between systems

- Built using modern programming language and available application programming interface

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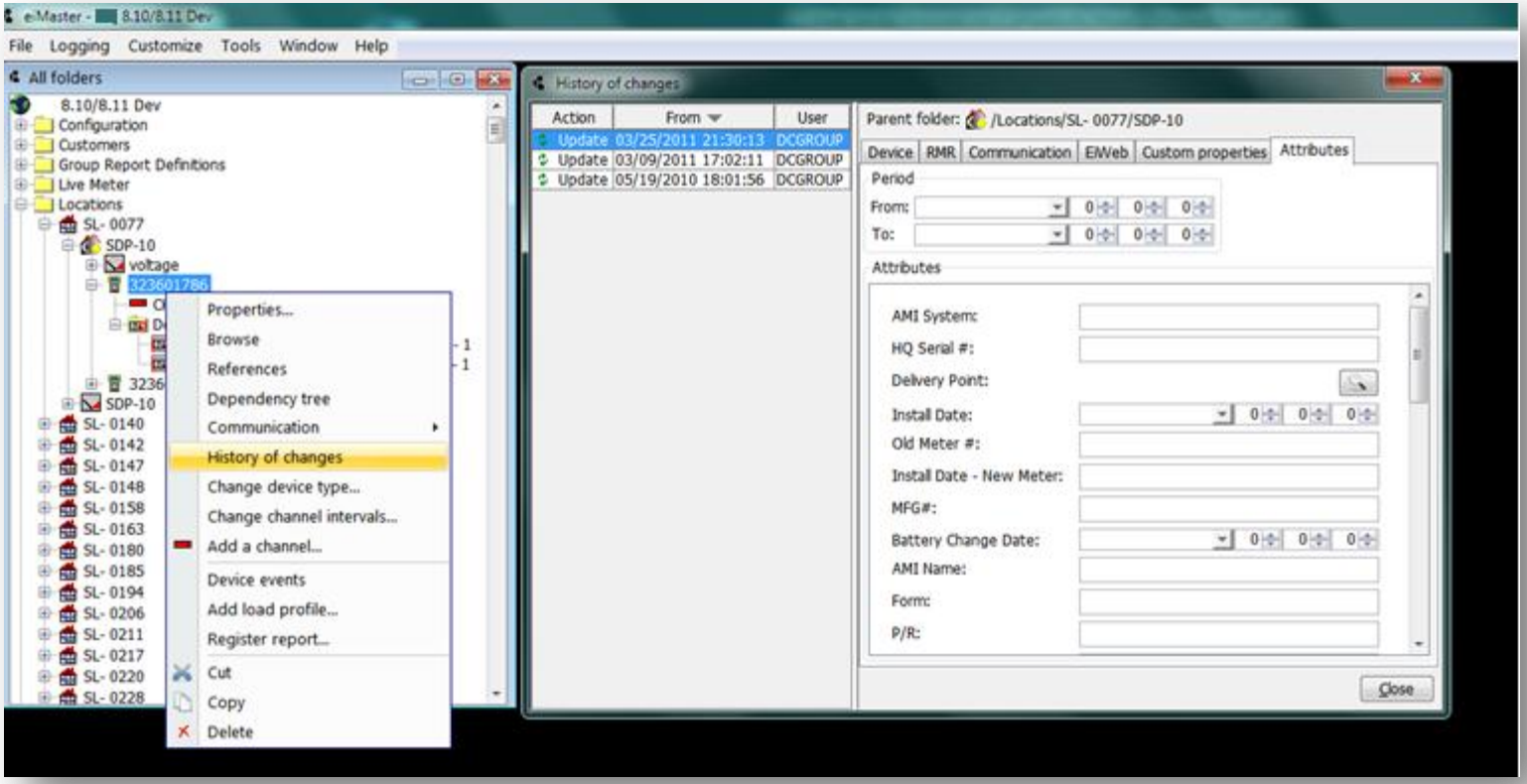
Characteristics of modern data collection system

- Full SOX compliancy
  - All master data changes versioned with audit capabilities



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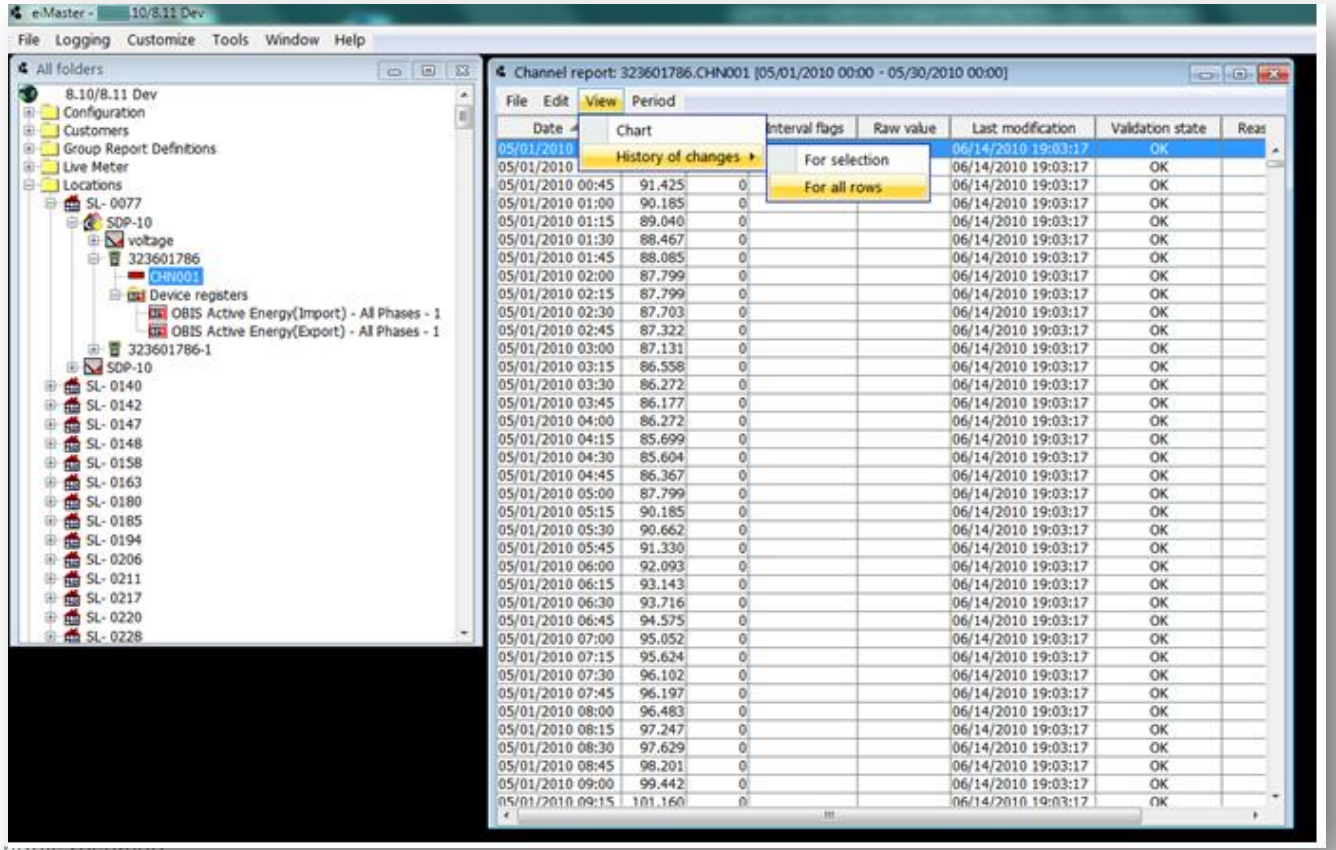
Characteristics of modern data collection system

- Full SOX compliancy
  - All changes made to interval and register data versioned



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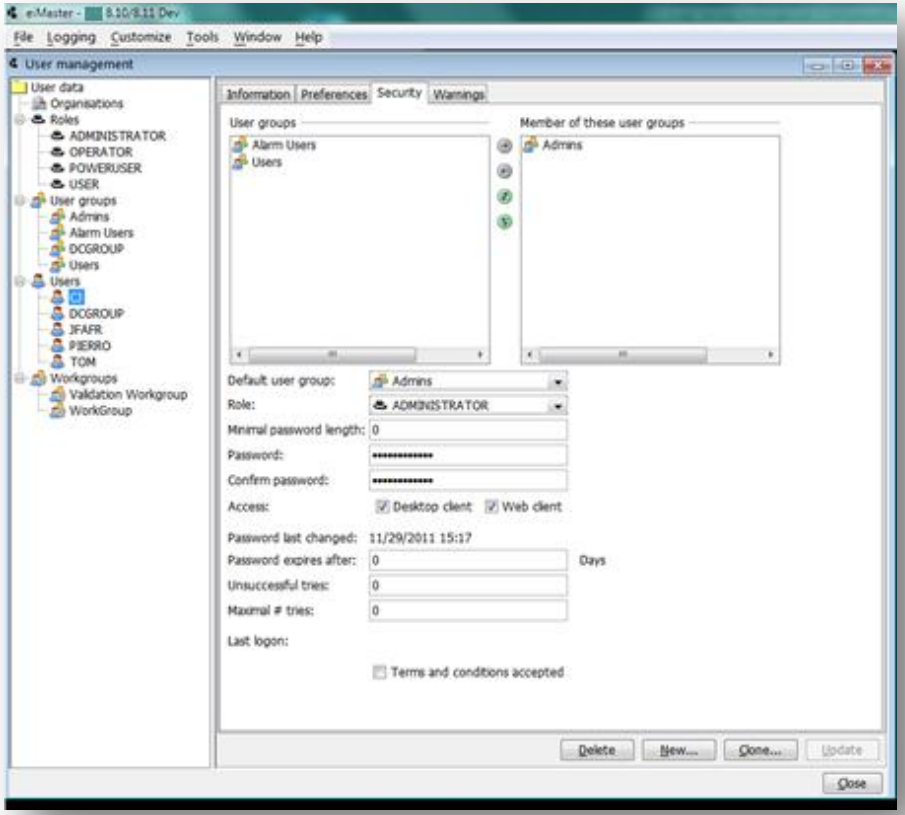
Characteristics of modern data collection system

- Security model supports disparate user functions and roles that meet requirements demanded by professionals



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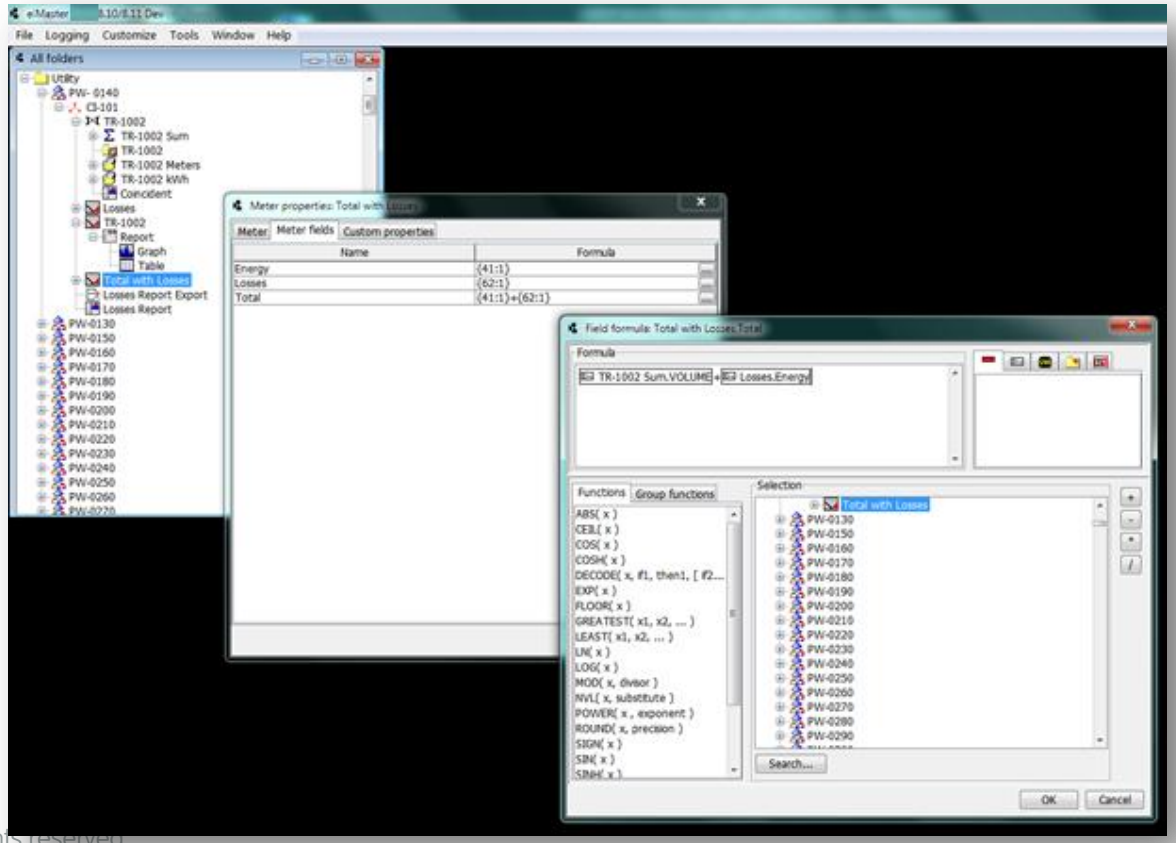
Characteristics of modern data collection system

- Aggregation function that allows for full versioning of mappings as well as flashback feature



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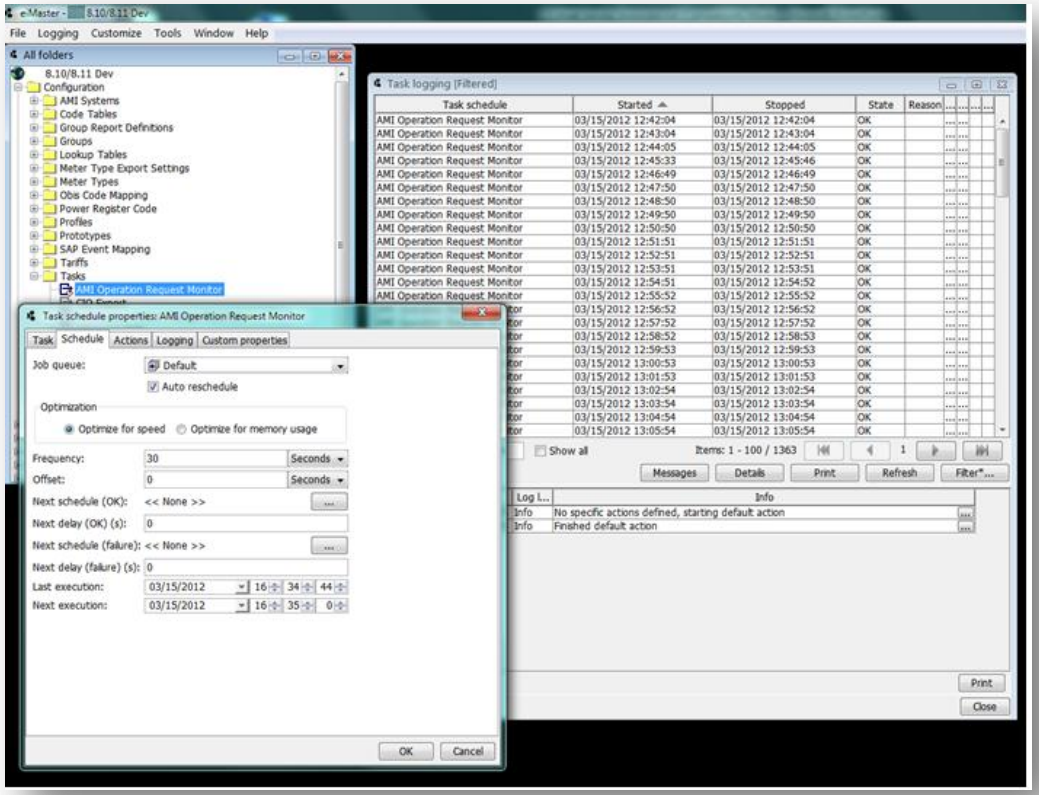
Characteristics of modern data collection system

- Unrestricted job scheduling and processing capabilities with detailed logging. No limits on number, or types of exports



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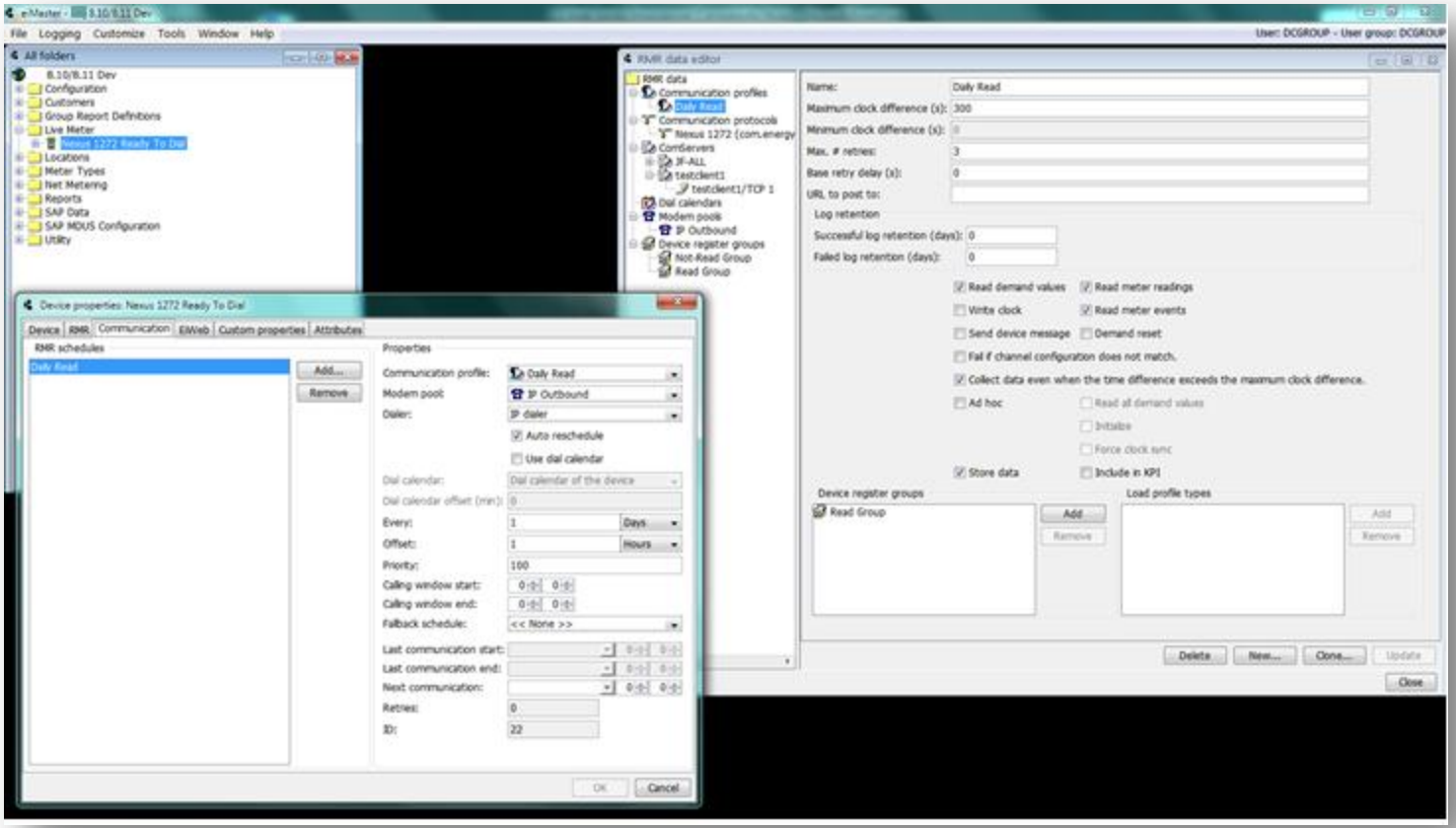
Characteristics of modern data collection system

- Powerful communication and scheduling capabilities for remote meter reading including built in protocol analyzer



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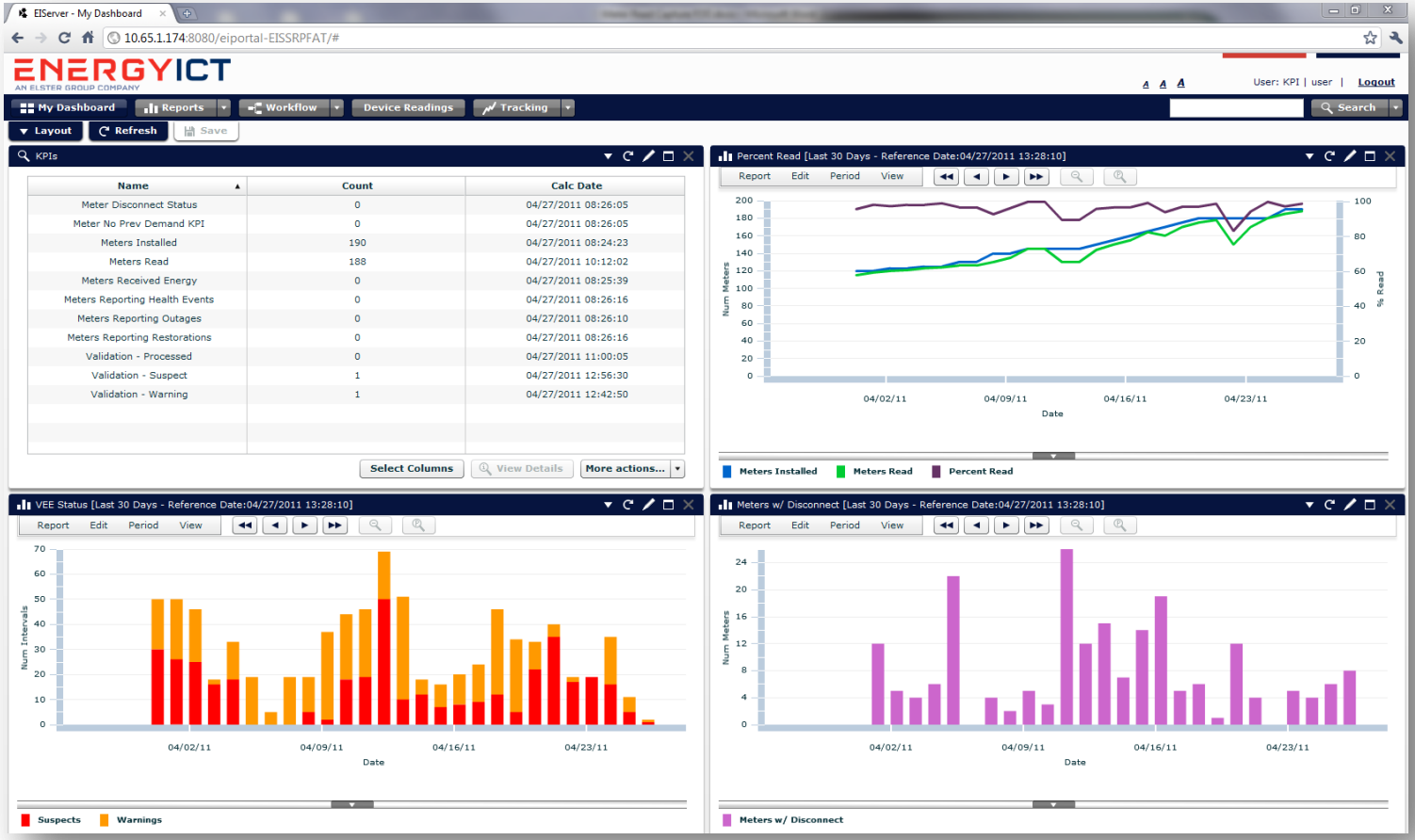
Characteristics of modern data collection system

- Modern operational dashboard to monitor KPIs



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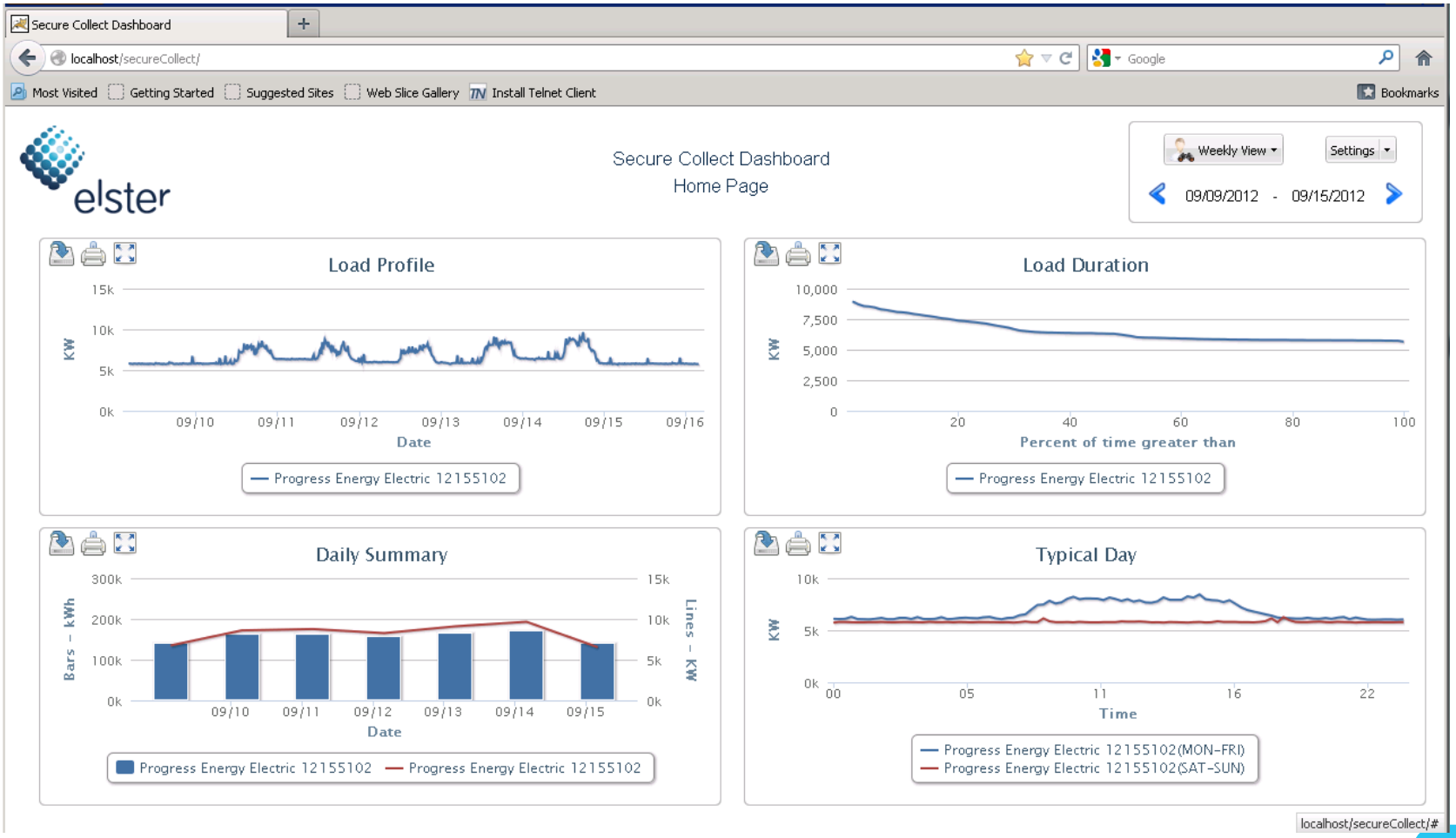
Characteristics of modern data collection system

- Modern end customer dashboard for load analysis



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Extending the solution

- ElServer SecureCollect provides IT grade security in the back office
- What about the field devices…
  - High end electric meters
  - Typically handling a very large percentage of the utility billing revenue
- A complete end-to-end solution must include evaluation of the field devices
  - Security
  - Communications reliability
  - Communications efficiency

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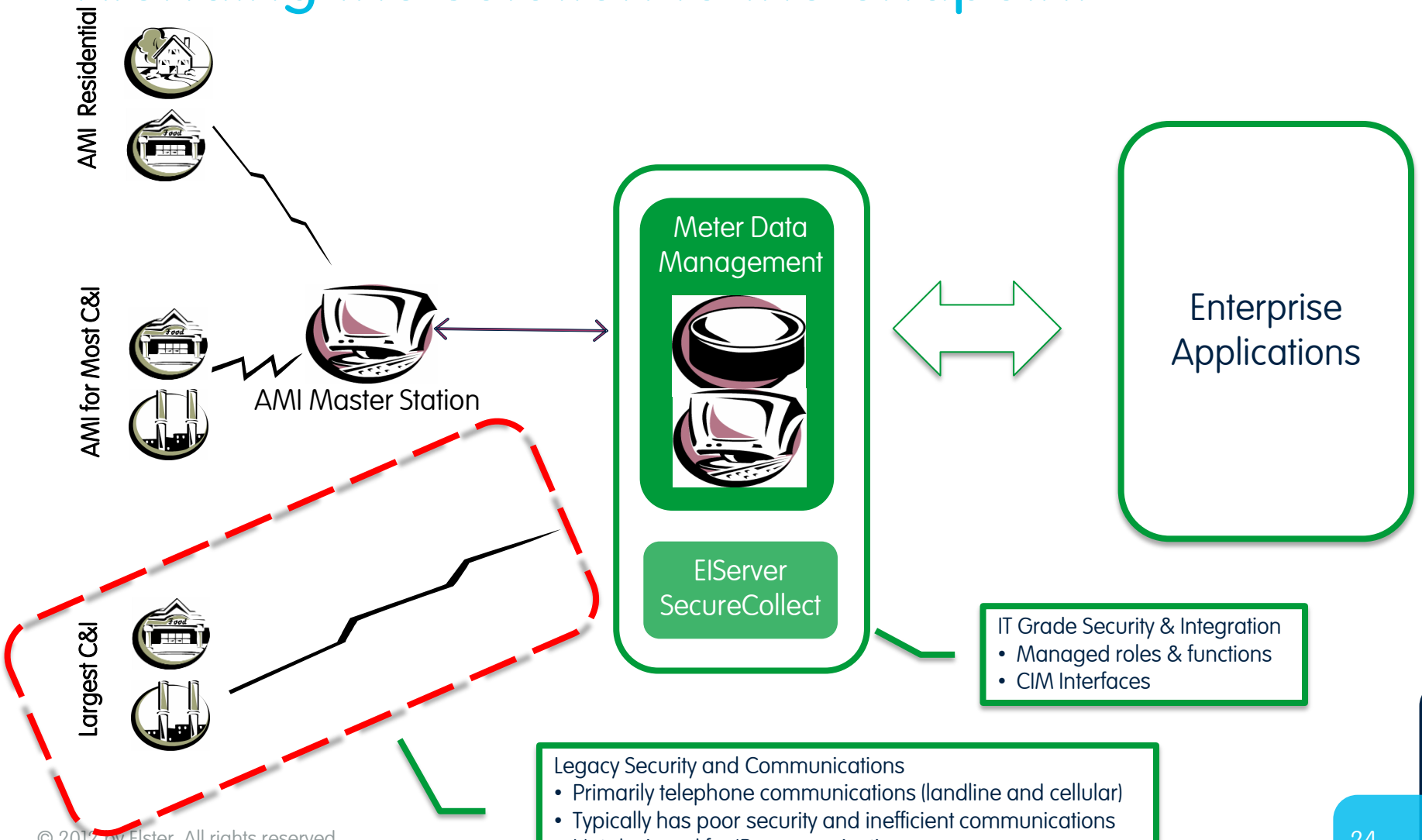
Extending the solution to the endpoint



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History of field device communications

Protocol	Type of Communciation	Description
ANSI C12.18	Optical port (local)	Designed for local communications at the device using handheld reading devices
ANSI C12.21	Telephone (remote)	Extends C12.18 to support communications over a telephone connection. Intended for point to point session based communications only.
ANSI C12.22	IP (remote or local)	Designed for packet based IP transport of meter data regardless of technology (ethernet, cellular, serial port, optical port, etc.). Supports session based and sessionless communications.

- C12.22 was designed by the industry to address shortfalls of C12.21, particularly in the areas of IP communications and security
- C12.22 is the only application layer standard designed from the onset for IP communications to metering devices with security aspects built in
- Nearly all of the largest C&I accounts are still connected using ANSI C12.21 telephone protocol
  - Many still use dial up telephone modems
  - Those connected via cellular, ethernet, or other IP connection depend on inefficient "wrapping" of C12.21 data into IP packets.
    - Reduced reliability and increased communications time

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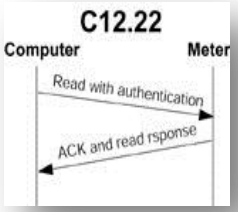
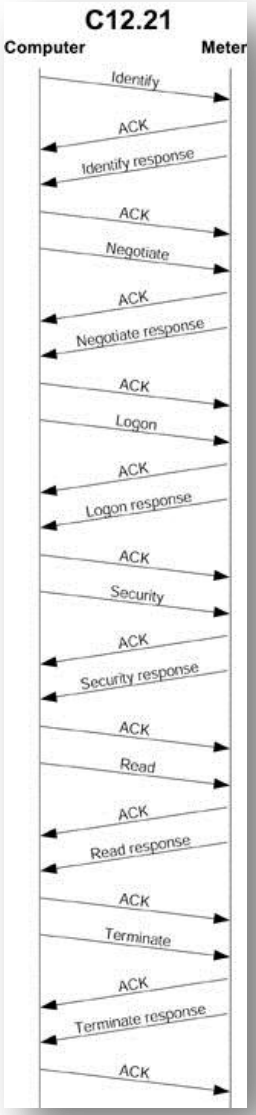
Messaging comparison





C12.22's Sessionless communication has the advantage of requiring less complex handling on both sides of the communication link and fewer packets exchanged, communications tend to be shorter and take less time.

Thus reducing air time in wireless communications.

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Security of field device communications

Protocol	Type of Communciation	Security
ANSI C12.18	Optical port (local)	Limitations: Password sent in the clear. Designed for local connection while standing at the device.
ANSI C12.21	Telephone (remote)	Limitations: Provides encrypted authentication but no means to encrypt the payload data (assumes secure telephone line).
ANSI C12.22	IP (remote or local)	IT level security: Provides authentication and payload data encryption using AES.

- Industry concerns
  - Difficult to manage passwords / security keys
  - Multiple meter types with unique security
  - Common for utilities to use the same password for all devices

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Elster's solutions

- Industry leading C&I metering solutions for high end revenue applications supporting C12.22

  A3 ALPHA meter with WAN Interface Card
  - End-to-end standards based IP at every communication layer
  - 100% "under the cover" smart meter solution
  - Cellular and ethernet versions available
  - Commercial product – in deployment
  - No batteries - incorporates super capacitor technology

- Support for encrypted authentication <u>and</u> encrypted data
- Unique crypto-keys for every device
- Patented methodology for key management
  - Securely change keys system wide <u>with simple process</u>
  - Key recovery
  - Control encryption (enable/disable)
- Continued system support for legacy devices using C12.21
  - Enables smooth transition to C12.22

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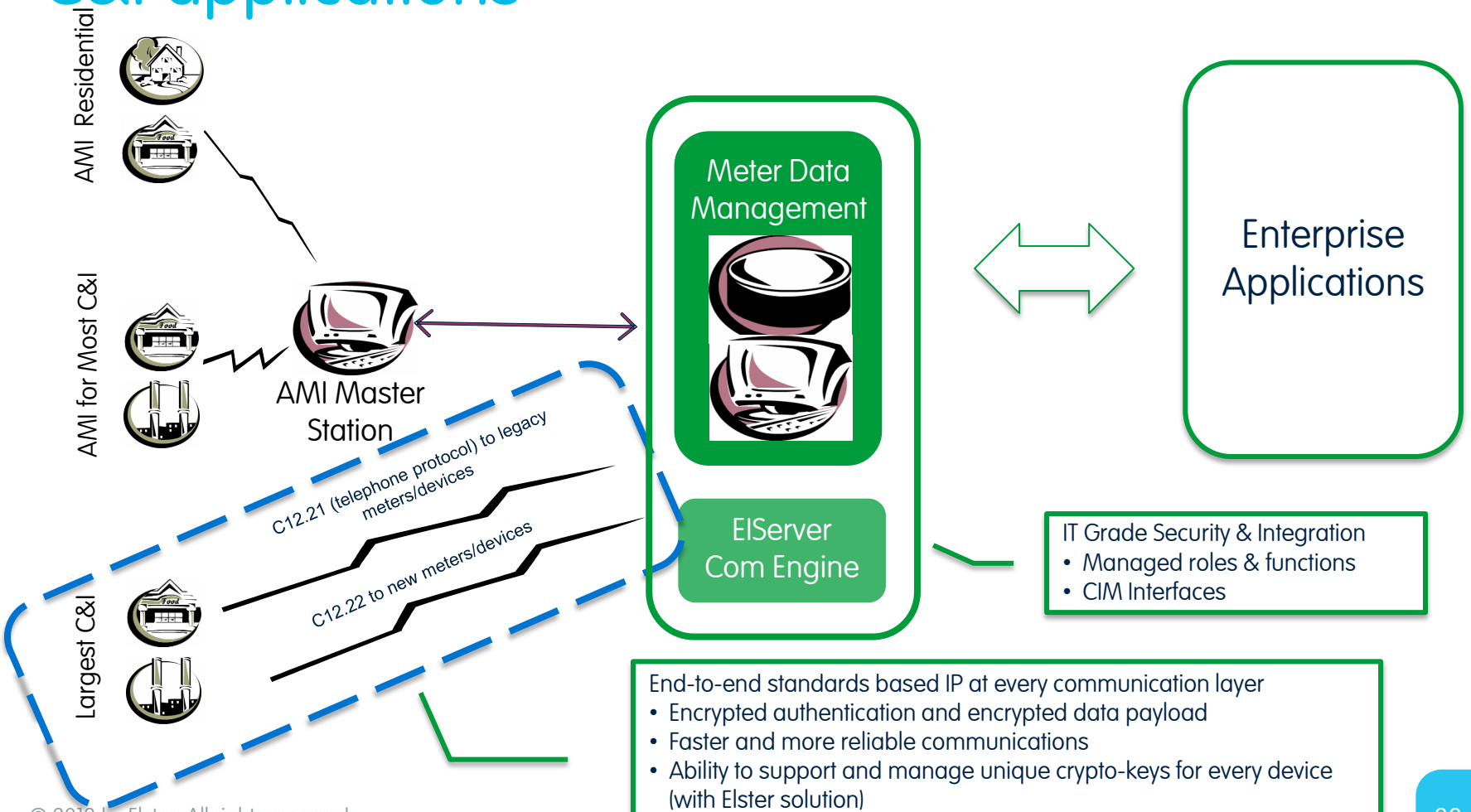
Complete solution for upgrading legacy C&I applications



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Summary:
Measurement & billing of largest C&I accounts

	Legacy Applications	Today's Solutions
Enterprise systems for supporting C&I accounts	Poor enterprise level security	Security compliant with IT guidelines including customization of user functions and roles
	Non standard interfaces	CIM based web service interfaces
	Limited versioning / audit capabilities	Full versioning / audit functions for SOX compliance.
	Restricted job scheduling and export capabilities	Unrestricted scheduling and no limits to the number or types of exports
Remote device communications	Use C12.21 telephone communications standard	Uses C12.22 protocol "designed" for IP transport of meter data. Supports C12.21 for legacy devices.
	No data encryption	AES data encryption
	Inefficient and chatty when used over an IP link (cellular).	Designed for IP. More reliable connection. Faster communications. Less data/airtime to accomplish same tasks.

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Thank you

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Vital Connections