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Electricity Balancing System IT Subgroup

6th December 2011, Wokingham

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Safety

- No fire alarm tests planned for today
- If fire alarm rings then follow NG staff out of the building and assemble in the visitors' car park (right-hand-side of entrance looking at it from inside the site)

Introductions

National Grid:

Robert Paterson – External Requirements Manager X3664

Sally Cox – Technical Secretary X3635

Steve Roberts – Test Manager X3826

Pete Smith – Transition & Release Manager X3791

Afe Ogun – Lead Solution Architect X3709

Rob Apperley – EDL Domain Expert X3349

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[All telephone numbers 0118 936 then four digit extension number]

Arrangements for today

- You've been e-mailed these slides and the terms of reference
- Review of agenda
  - Lunch 12:30 – 13:00 in meeting room
  - Optional visit to control room viewing gallery after meeting
- Anything else we should cover?

Outline of this presentation

- Overview of Electricity Balancing System
- Timescales
- Industry Interfaces and Testing
- Planned Data Changes
- Architecture / Infrastructure Overview

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Overview of Electricity Balancing System

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What is the Electricity Balancing System?

- Replacement for the Balancing Mechanism System
- Balances generation and demand in order to control system frequency
- Ensures power flows do not exceed system capability
- Market participants send it data (currently by EDL & EDT)
- Issues instructions (Bid-Offer Acceptances and Ancillary Services) via EDL
- It delivers data to the Balancing Mechanism Reporting Service (BMRS), the Settlement Administration Agent (SAA) and Ancillary Services Settlement

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Why the Electricity Balancing System (1) ?

- Existing Balancing Mechanism systems are essentially the Electricity Pool systems modified for NETA operation in 2001 and for subsequent market changes
- Looking to improve system availability and resilience:
  - Tactical – BM Asset Upgrade
    - Replace infrastructure with latest versions of existing technology
    - Already delivered
  - Strategic – Electricity Balancing System
    - Higher availability (99.95% vs. 99.6%) & resilience
    - Reduced mean time to recover – around 20 minutes, rather than current minimum of 90

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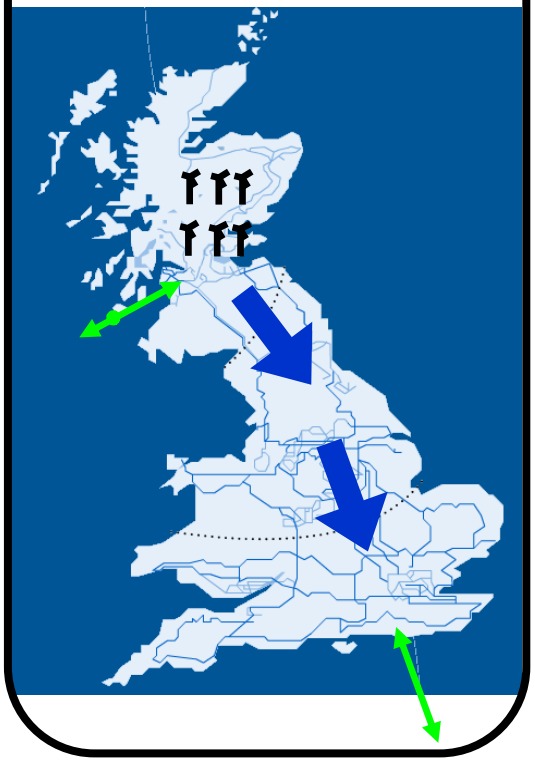
Why the Electricity Balancing System (2) ?

- Help manage the impact of the decarbonisation of electricity e.g.
  - Wind Generation
  - Big nuclear units c.1800MW
  - Novel transmission equipment to transport this power

Why the Electricity Balancing System (3) ?

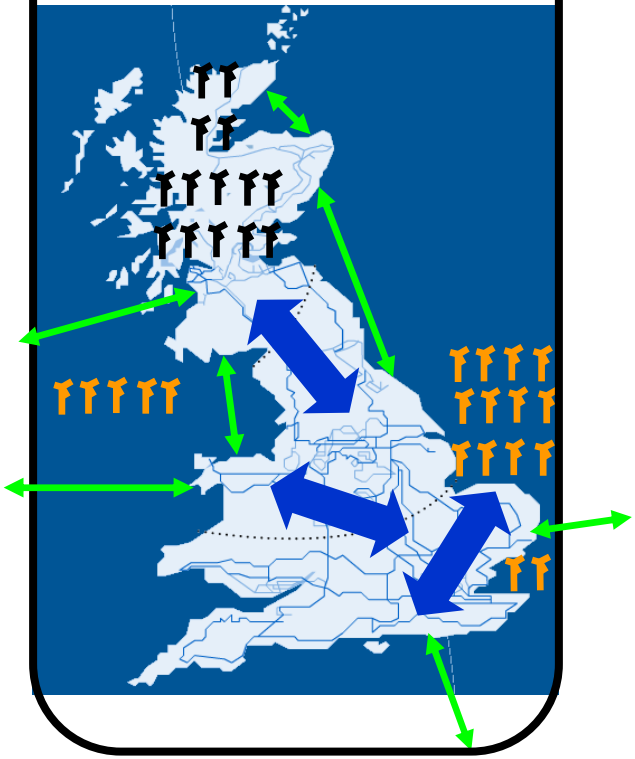
2010

Generally unidirectional
Reasonably predictable



2020

Variable in direction
Time varying
Difficult to predict



Electricity Balancing System – Who?

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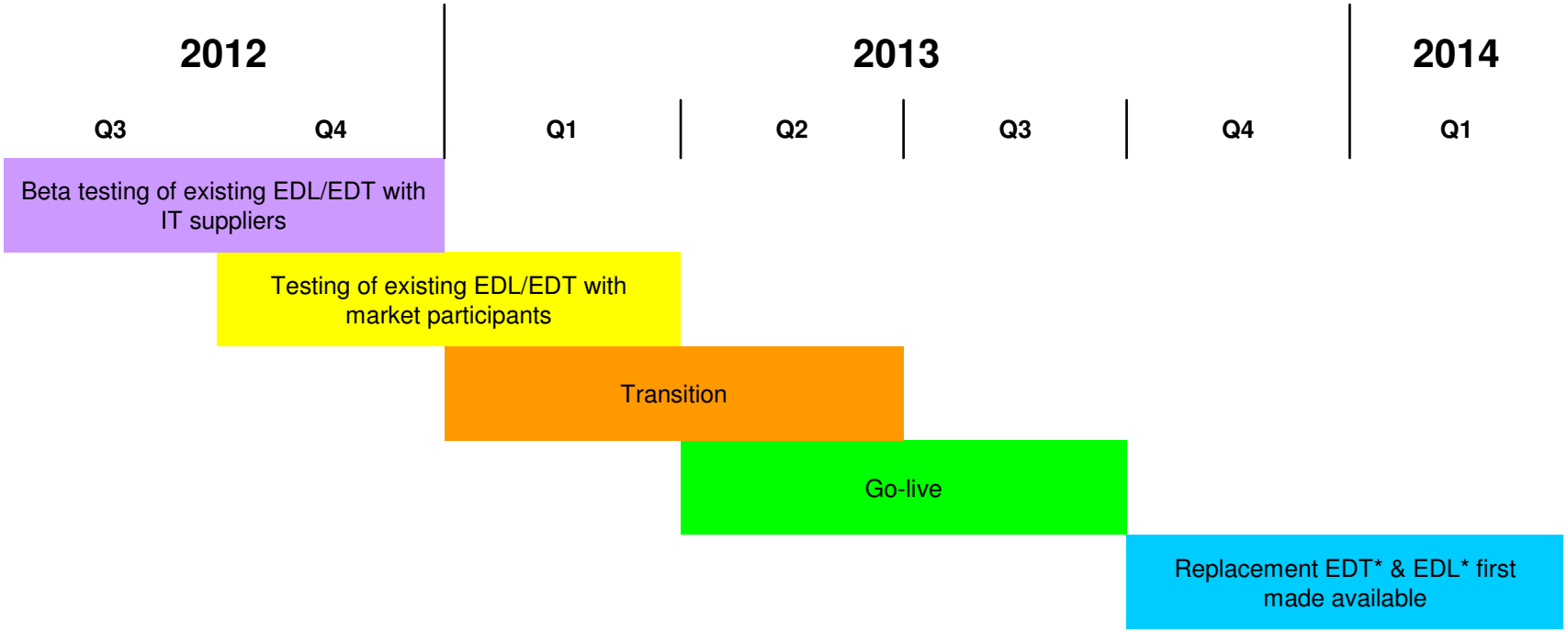
- Buying it from ABB
- Result of competitive tender
- Other users of ABB Market Management System (generic name) include:
  - NYISO
  - SEMO – Whole of Ireland Day Ahead Market
  - ERCOT (Texas)
  - Ontario
  - Philippines
  - National Grid - SuperGOAL

Electricity Balancing System – When?



- Start of time-range is the earliest that the activity will start
- End of time-range is the latest that the activity will finish
- We will revise this and increase the resolution as the project progresses
- If there are any significant changes, we will let you know when we know

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Industry Interfaces and Testing

Industry Interfaces - Overview

- Two industry consultations
- Can find them and industry responses at: http://www.nationalgrid.com/uk/Electricity/Balancing/EBS
- EBS will provide two types of market participant interface
  - Existing EDL and EDT
    - Available from go-live
  - Web-technology replacements for EDL and EDT
    - Known as EDL* and EDT*
    - Greater range of communications and client-end options
    - Supports enhancements to data submissions & instructions
    - Available from around 6 months after go-live

Existing EDL & EDT interfaces

- ABB will be implementing these unchanged in EBS
- These will be the only interfaces available at go-live
- No participant-end system changes required at go-live
  - Though firewall, DNS and password changes may be required
- The industry was consulted regarding cut-off dates for support of the existing interfaces
  - View was to support them for up to 5 years after go-live
    - Aligns with 1st EBS infrastructure refresh

Testing existing EDL & EDT

- Our thoughts – welcome your views:
  - Start with type test of each IT suppliers' systems
    - Certification of successfully-tested versions
  - Then market participant test boxes to pre-production EBS
    - Certification of successful tests
  - Market participants update their production systems' configuration parameters so can communicate with EBS
    - Details TBD
  - Where practicable, connect market participants' production systems to EBS to confirm can connect
    - E.g. Switch EDL to connect to EBS in "blocked" mode

Replacement interfaces

- Known as EDL* and EDT*
- EDL* is web-technology replacement for instruction-issuing part of EDL
  - To submit data, EDL* clients will call EDT* web-service
    - Common data submission & validation, unlike at present
- EDT* is web-technology replacement for EDT supporting:
  - Computer-to-computer exchanges (as existing EDT)
  - Web page
    - XML file upload
    - Web form data entry

Telecommunications & Security

- The replacement interfaces, EDL* & EDT* support traffic over:
  - Private networks
  - Internet (hard token likely to be required)
- EDL* & EDT* will require digital certificates

Market Settlement & Information

- National Grid to BMRA/SAA interface:
  - As per approved BSC Change Proposal 1345
    - Traffic from NG to BSC Co will be in CSV format at go-live
    - Subsequent phased migration to XML
  - Likely to be changes to interface to publish new and revised data supported by EDT*

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Planned Data Changes

Planned data changes (1)

Go-live (or before)

- Remove obligation under BC1.4.2(e) to submit "Dynamic Parameters (Day Ahead)" - you can still submit them, we just won't use them

Go-live with existing EDL and EDT

- No data changes from existing interfaces
- But may be one or two minor validation changes
  - E.g. Don't intend enforcing gate-closure for MEL submitted by EDT

Planned data changes (2)

When EDT replacement is offered to market participants (after go-live)

- Subject to Grid Code change
- Introduction of time-varying SEL/SIL – data structure like MEL/MIL
- Increase the number of Run-Up and Run-Down Rates that can be submitted from 3 to 10 (standard product functionality)
- Reduce minimum rate from 0.2MW/min to 0.02MW/min
- Also have the option to submit “special actions” Run-Down (and if applicable a Run-Up) Rate for use in an emergency

Planned data changes (3)

With EDT*, but subject to consultation & Grid Code change

Proposal is to make this “Other Relevant Data” formal parameters:

- Two Shifting Limit (TSL) – main area of contention
- Station Synchronising Interval (SSI)
- Station De-Synchronising Interval (SDI)
- Minimum notice to cancel a synchronisation (CS)

Longer-term

- Possible improvements to the modelling of multi-shaft modules (CCGTs, Cascade Hydro, Power Parks?)
  - Discussions starting, but potentially complex functionality

Planned data changes (4)

- Migrate Ancillary Services Operational Data “Redecs” from fax to electronic submissions (when EDT* is made available post-go-live):
  - Boolean frequency response availability on per (or all) contract mode basis
  - Reactive Power capability changes
  - Firm Frequency Response, Firm Fast Reserve and STOR unit substitutions
  - Firm Frequency Response and Firm Fast Reserve Boolean availability submissions
  - Station Black Start Capability (Boolean)

Planned Data Changes (5) – EDL*

- Target frequency instructions
  - Currently by phone or Operational Broadcast System
- Revisions to reactive power instructions:
  - For immediate action or at some future specified time
  - Sent to one unit, or more than one unit i.e. simultaneous
  - Type of instruction:
    - Target MVAr
    - Target voltage in kV or per-unit
    - Tap instruction – no. of taps, raise or lower volts

Registration Database

- Replacing existing registration database (which would have needed a refresh anyway) with ABB's which is part of their product suite
- EDT* will allow market participants to submit registration change requests, monitor progress and view their current registration data
- Introduce concept of Control Point Agent for EDL & EDL* - counter-part to Trading Agent for EDT & EDT*

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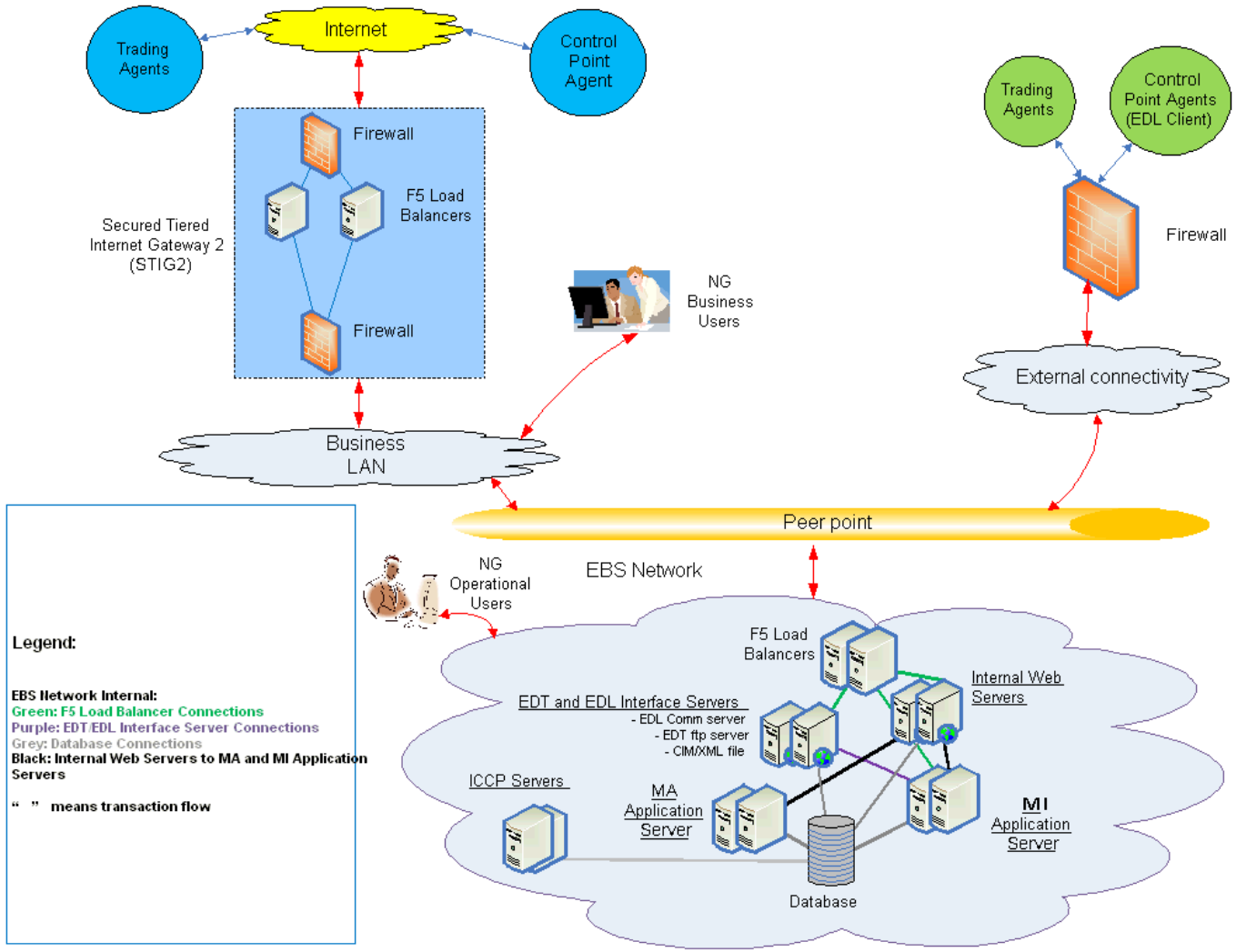
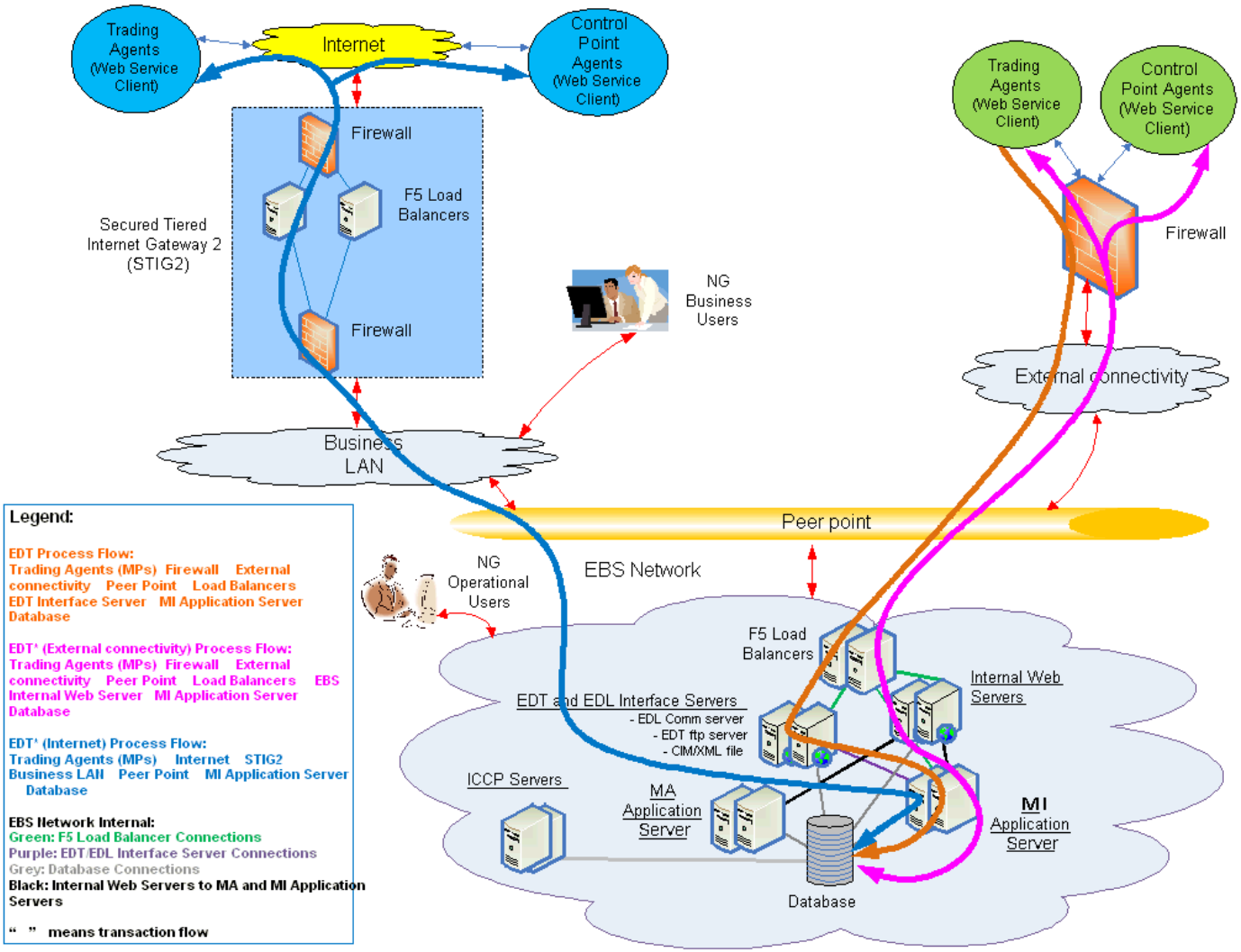
Architecture / Infrastructure Overview

Architecture Overview



Infrastructure Overview – EDT/EDT*



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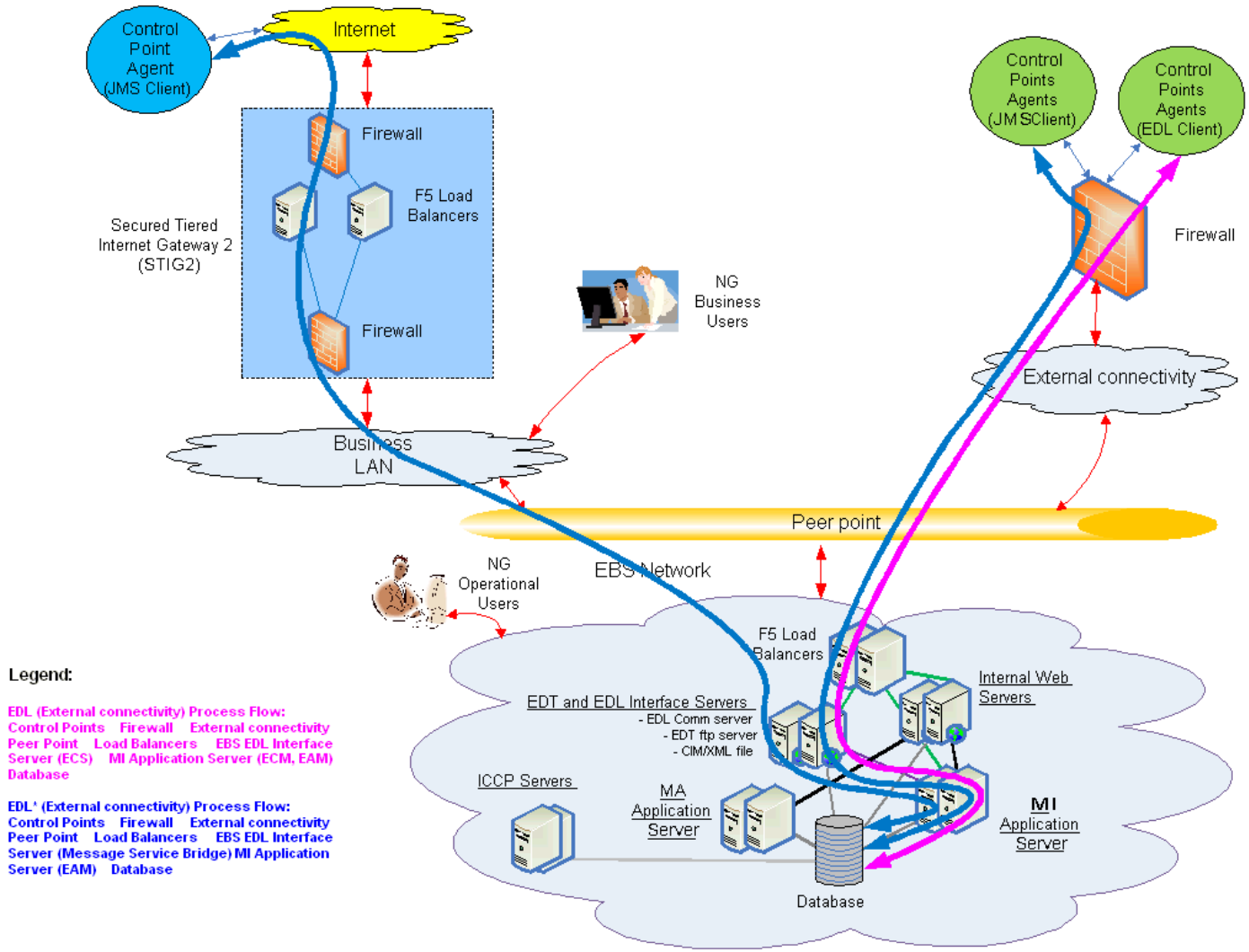
Infrastructure Overview – EDL/EDL*



Any questions?

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