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NTRG Workshop

Flood Warning Telemetry Developments

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Outline

- Building a Robust Infrastructure
- Flood Warning Telemetry
- Looking Forward



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Building a Robust Infrastructure

- Identify service level requirements – define early, will/may affect end-to-end design!
- Redundancy – DR or Full Business Continuity?
 - At field level – redundant sites and/or redundant comms?
 - Communication layer/s – multi-vendor, multi-transport
 - Collection and Management Systems
 - Support
- What is Flood Warning Doing?



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WD Virtual Infrastructure

- Virtual Infrastructure hosted on
 - VMWare Enterprise Edition
 - Enterprise class fibre channel SAN disk arrays
 - Full redundancy of network and storage paths
 - Dual power
 - Award winning Canberra data centre
 - High-end Enterprise Class Servers with 4 slot (CPU) multi-core Nehalem processors
 - Stage 3 upgrade in progress,
 - adding 200TB (growing to 500TB) open storage,
 - backup capability with Automated tape library
 - additional latest Nehalem-EP servers
 - Telemetry servers will run in fault tolerant mode (lock-step)



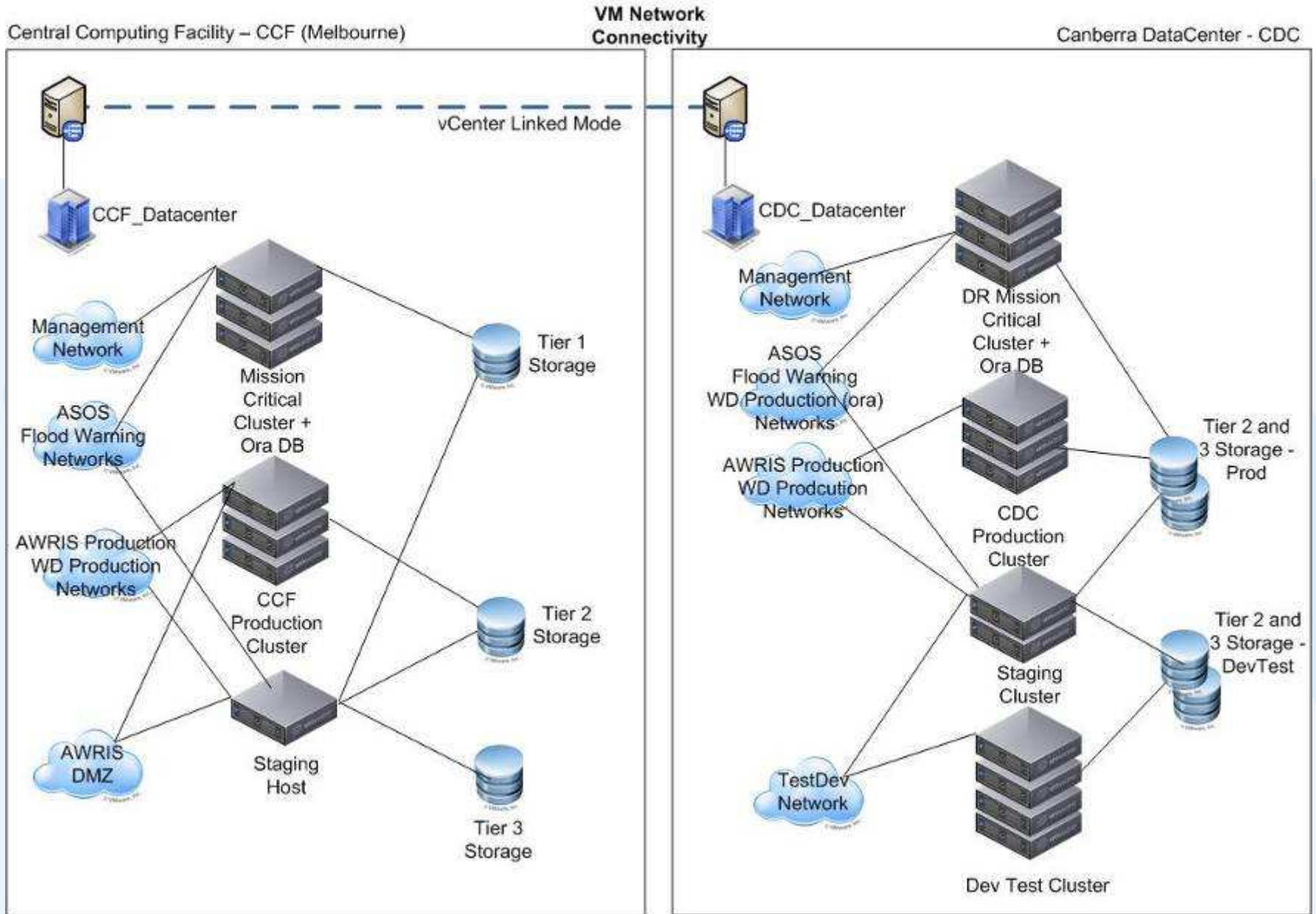
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WD Virtual Infrastructure - Canberra



WD VI - Physical Host Clusters





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Flood Warning Telemetry Summary of Flood Warning Sites

Region	Rainfall Sites	River Sites
QLD	1098	872
WA	208	2
NSW	465	567
VIC	167	307
TAS	55	87
NT	36	23
SA	79	44
Total	2108	1902



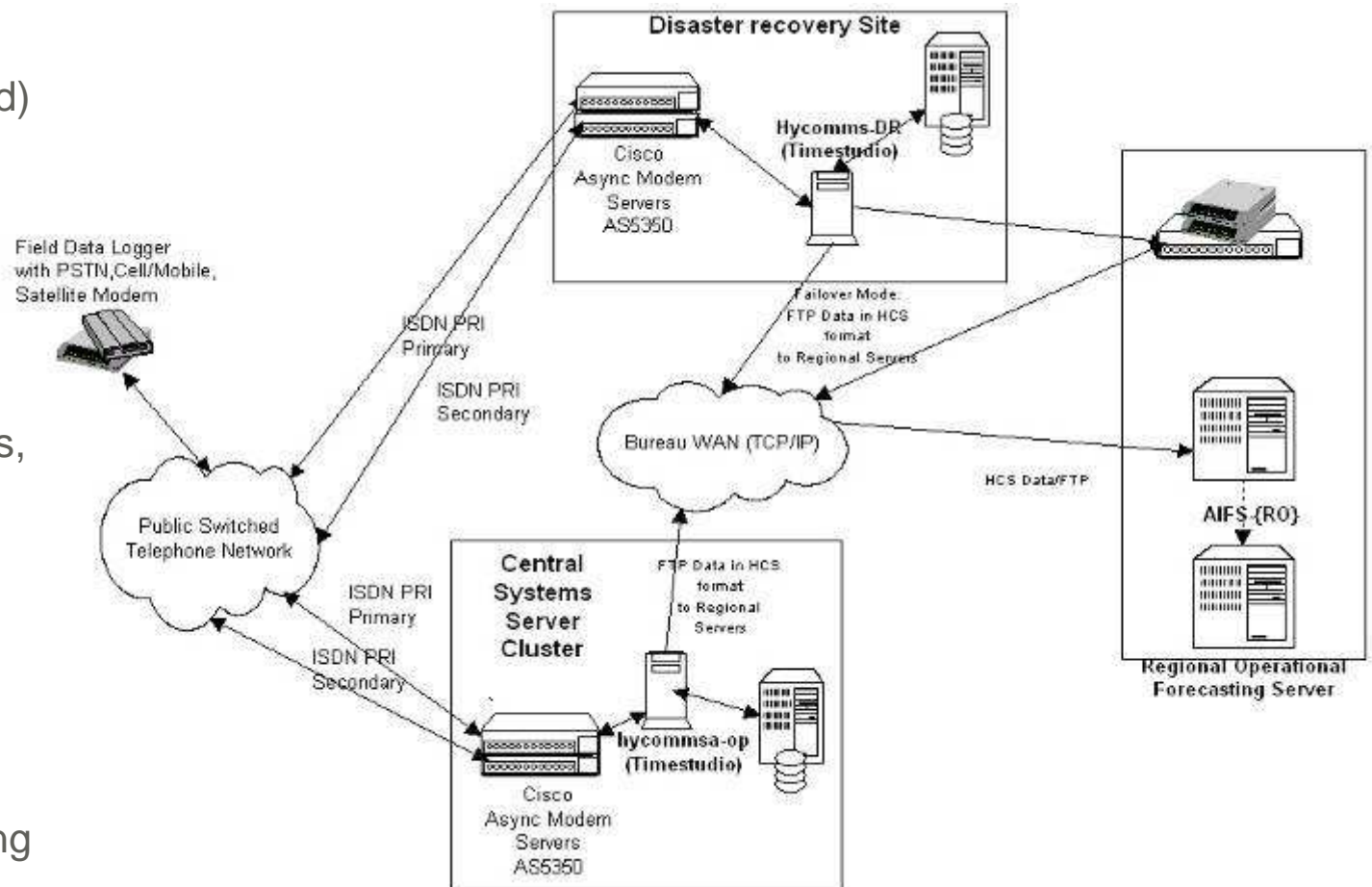
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Flood Warning Telemetry – Polled (pull/get)

- National (centralised) Virtualised Server Infrastructure
- National Disaster Recovery Virtualised Server Infrastructure
- Virtualised: Modems, Servers & Storage
- Providing dynamic server failover within clusters and across sites.
- Allows for easy installation and trialling of future polled telemetry solutions





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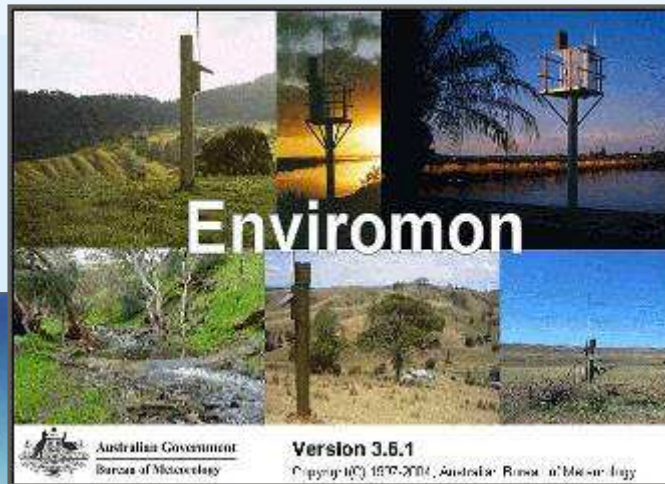
Flood Warning Telemetry – Event (push/accept)

- FTP in HCS format from Agencies
- Event Telemetry
 - VHF Radio (ALERT)
 - VHF Radio to IP
 - HYEVENT
 - Over Iridium Satellite
 - Over Cellular



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Event Reporting Telemetry System - Enviromon



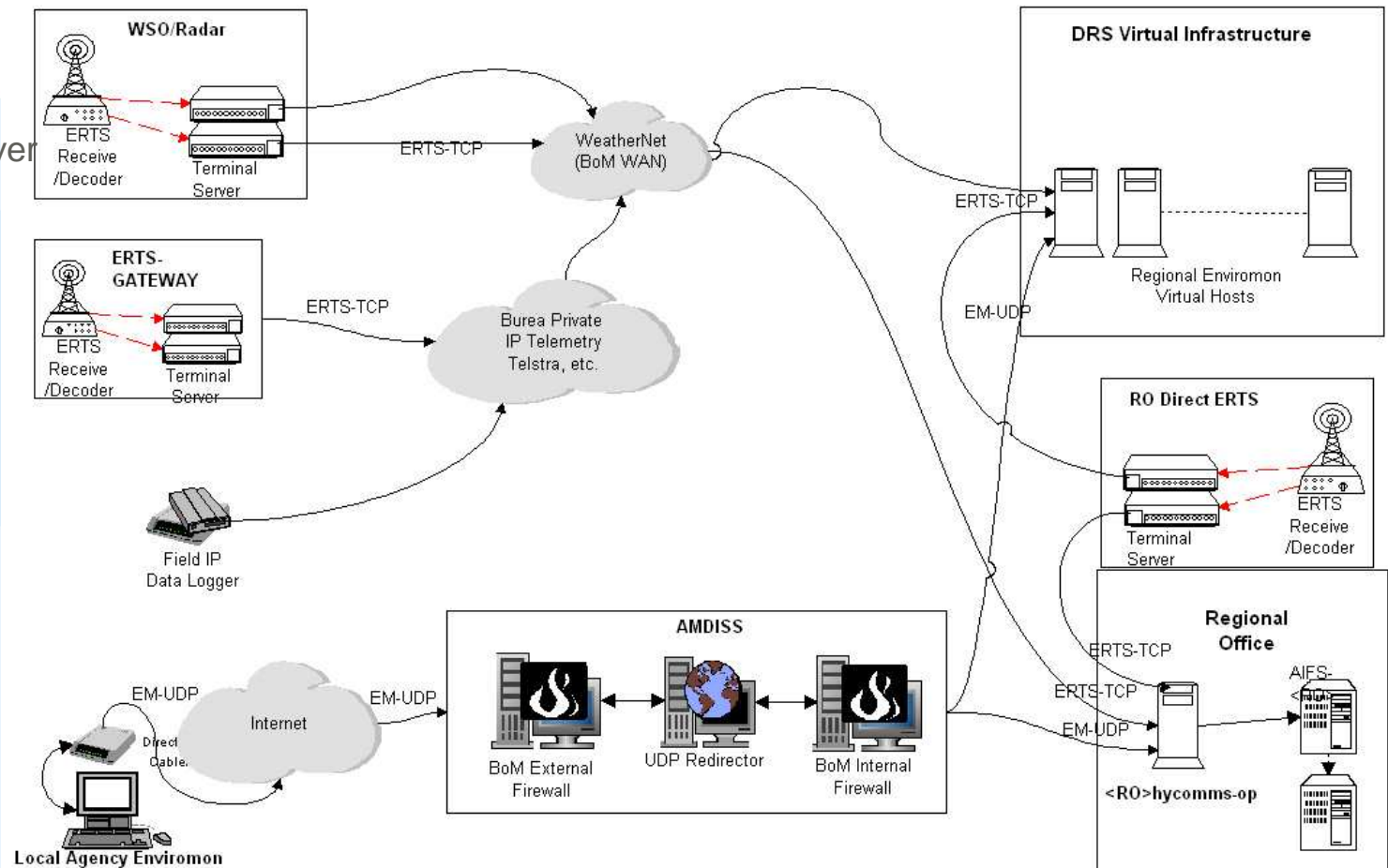
- ALERT concept from N.W.S USA
- Bureau provides to over 130 agencies
- Local Agency and Emergency Service direct storage, analysis and display of rain & water level data.
- Real-time and off-line continuity and bounds filtering
- Alarming of rain rates, threshold water levels, sensor inactivity via SMS, E-Mail and custom methods
- Modified to ingest HYEVENT message



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Event Reporting Telemetry System - VHF/UDP/TCP

- Primary Regional server (physical now VI upgrade in progress)
- Virtualised DR Server Infrastructure
- Direct VHF Radio
- IP Event Logger Support over UDP – send to multiple destinations
- VHF to IP ERTS Gateway over Cellular
- Agency EM-UDP on-forwarding





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Eventing over Iridium-SBD into Enviromon – it works

- Utilise commercial off-the-shelf logger
- Real-time eventing capable with hold-off, hourly (configurable) check/status message
- Time sync of logger using NTP
- Observation Date stamped at source in UTC
- Advantages of using data accumulator but not limited in size like ALERT v1
- Flexible ID used, no ALERT v1 ID limitations
- Sends new BoM-HYDRO EVENT message to Enviromon mimicking ALERT data, therefore no backend changes required.
- SEND to multiple destinations

```
HE=01|SID1=123456||UTC=20061115121101 R-0=1055||CRC=|NN
```



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Looking Forward

- NO SINGLE WAY IS THE BEST WAY, Unless... there is guaranteed 100% continuity of systems end-to-end, and who has that! So we build systems based on this premise!
 - Ensure diversity of communications for critical sites!
- Large costs are involved in the integration of backend systems, support and data management – It's just not the field stuff but the end to end data flow.
 - Current focus for Bureau Flood Warning Systems upgrade is to migrate data collection systems infrastructure ensuring business continuity across "national operations".
 - Implementing redundant alternate communications paths, Radio with additional radio repeaters, additional Radio to IP gateways, IP over Cellular and Iridium-SBD.



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Looking Forward...

- Next Version of ERTS (ALERT) Gateway in progress, utilises Radio modem and customised cellular router, low cost and simple without proprietary legacy components.
- Next Generation multi-purpose field telemetry device
 - COTS logger
 - Plug in single or multiple comms to suit, VHF-Radio, Cellular, Sat.
 - Multi-protocol capability
- Implementing direct TCP interface from Iridium gateway to Enviromon input plug (listener)
- ALERT v2 protocol in development. Utilises modern network layer approach to radio protocol, separating application payload (with site id and data) to network layers (device id). Protocol will repeat existing ALERT but also new ALERT2 payloads with higher bit rates, extended message length with error correction. Optionally uses Time division multiplexing with time offset part of new message standard.
- National broadband, Telstra WLL broke things...
- Final Point, polled telemetry allowed for multiple agencies to interrogate devices which usually enforced a single approach based on propriety protocol. Event devices introduces issues such as:
 - Messaging standards –decodeable!;
 - Time referencing
 - Meaning of data values;
 - Meaning of what is an event;
 - Sending (access to) multiple destinations for redundancy but timeliness of use for real-time users



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Thank you...

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