RMAN Backups of Oracle Standby Databases

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• Operating in 170 countries
• More than 16 million customers, from individual consumers to government departments and multi-national companies
• Consists principally of four lines of business: BT Global Services, Openreach, BT Retail and BT Wholesale
• Principal activities include networked IT services, local, national and international telecommunications services, higher-value broadband and internet products and services

Helping customers thrive in a changing world
BT Oracle Production Databases: Current Estate

- **Database Platforms**
  - 1,500+ Unix Servers
  - 4,000+ Instances, including standby databases
  - Oracle 8i -> Oracle Database 10g
  - Solaris, HP-UX, Linux
  - Daily Oracle database backup volume = 200TB+ (excludes largest VLDBs)

- **Applications**
  - OLTP, Warehouse, batch/order processing, Siebel, in-house

- **Oracle Backup & Recovery Methods**
  - OS “hot backup” to tape
  - RMAN backup to tape
  - RMAN incremental backup to disk
  - RMAN ‘incremental forever’ to Flash Recovery Area (FRA), then backup FRA to tape.
    - Primary and standby databases backed up using control file as RMAN repository (backups are not shared).
  - Array-based snapshots

- **Media Management**
  - Symantec NetBackup 6.0
  - 6,000+ NetBackup Clients (many non-database)
  - Networked and dedicated configurations
Data Volumes: Sustained, Consistent Growth

Daily Oracle Database Backup Volume (TB)

May 2006 (~ 60 TB)

May 2008 (~160 TB)

RMAN is key to scaling with this data growth.
BT Oracle Production Databases : Evolving Estate

• Consolidation of Oracle Platform to shared, pre-provisioned environment
  – Oracle MAA-based architecture
  – Pre-provisioning => reduces overheads to design, build, deliver
  – Catalogue of pre-defined database services
  – Published RPO / RTO associated with each database service
  – Oracle Database 10g -> Oracle Database 11g on RedHat Linux
  – Suitability for 90%+ of DB requirements

• Smaller, smarter set of Backup & Recovery Methods
  – RMAN only
  – Deploy Recovery Catalog for backup management
  – Offload backups to standby databases
  – Increase adoption of RMAN incremental backup techniques

• Media Management
  – NetBackup
  – VTL
  – Oracle Secure Backup: faster tape backups via RMAN integration
Oracle Database Services

• Database Service Catalogue-based offerings
  1. Single instance, single site
     • Cold failover cluster within single site
  2. Multi-instance RAC database, single site
  3. Single instance, multi-site
  4. Multi-instance RAC database, multi-site

• Increased levels of service availability offered with each option.

• Maximum Performance Mode (asynchronous) for Data Guard

• Option 3 and 4 affords opportunity to offload backups to standby database.
RMAN Backups Offloaded to Standby Database

- Advantages
  - Remove backup load & reduce storage on primary database
  - Minimize operational effort:
    - Perform all backup maintenance on standby database
    - Standard RMAN syntax on standby database
    - RMAN used to housekeep archived redo logs on standby

- Restore of primary from standby disk or tape backups requires network-based file transfer.

- Backup tags dynamically generated:

```sql
BACKUP DATABASE
  TAG       = 'emgclal_20080820051003_D'
  FORMAT    =
    'emgclal_20080820051003_D_469595531_%s_%p_%c_%t';
```
Standard RMAN Operations on Standby Database

- Automatic control file and SPFILE backup and/or current controlfile backup

```sql
CONFIGURE CONTROLFILE AUTOBACKUP
    FORMAT FOR DEVICE TYPE 'sbt_tape' TO 'emgclal_CTL_%F';

BACKUP CURRENT CONTROLFILE
    TAG = 'emgclal_20080820051003_D'
    FORMAT =
        'emgclal_20080820051003_D_c-469595531-20080820-051003'
```

- Backup maintenance performed on standby (note: scripts carried forward from older releases):

```sql
CHANGE BACKUP TAG 'emgclal_20080820051003_D'
    KEEP UNTIL TIME = 'SYSDATE+12' LOGS;

CROSSCHECK BACKUP
    COMPLETED BETWEEN 'SYSDATE-12' AND 'SYSDATE-10';

DELETE FORCE NOPROMPT EXPIRED BACKUP
    COMPLETED BETWEEN 'SYSDATE-12' AND 'SYSDATE-10';
```
RMAN Archived Log Management on Standby

• Archived log backups on standby:

```
BACKUP ARCHIVELOG
  FROM SEQUENCE = 19039
  UNTIL SEQUENCE = 19041
  THREAD = 1
  TAG = 'emgclal_20080820051003_A'
  FORMAT =
    'emgclal_20080820051003_D_469595531_%s_%p_%c_%t'
```

• RMAN used to housekeep logs:

```
DELETE NOPROMPT ARCHIVELOG
  FROM SEQUENCE = 19039 UNTIL SEQUENCE = 19040 THREAD = 1
DELETE NOPROMPT ARCHIVELOG
  FROM SEQUENCE = 14080 UNTIL SEQUENCE = 14081 THREAD = 2
DELETE NOPROMPT ARCHIVELOG
  FROM SEQUENCE = 14167 UNTIL SEQUENCE = 14168 THREAD = 3
```
Oracle Database 11g Features of Interest to BT

• Network-based Database Duplication: essential feature
• Network-based restore from standby database
• Recovery catalog tracks files & backups per db_unique_name
• Block change tracking on standby database
• Faster backup compression
• Open read-only database available whilst redo apply active (Active Data Guard)
• Closer integration with Oracle Secure Backup
  – Enhanced backup performance: eliminate committed undo during full backup
  – Reduced CPU utilization via integration with RMAN memory buffers