Infrastructure Management - Disaster Recovery

1 Overview of Service

This service description describes NTT's approach to the design, implementation, and management of a Disaster Recovery environment for the Client's Solution.

2 Service Specific Operations

2.1 Disaster Recovery Solution Design

When designing a solution for Disaster Recovery the following areas must be considered:

(a) Recovery Time Objective (RTO)*

(b) Recovery Point Objective (RPO)*

(c) Data size and rate of change

(d) Geography and connectivity

(e) Security and Compliance controls

(f) Cost

(g) The process for applying updates and patches

*NTT offers a standard SLA for RTOs and RPOs, which may not apply to all Client solutions. See Limitations section.

3 Supported Technologies

The following data movers/replication technologies are supported:

(a) Private NTT Cloud: Snapshot Replication

(b) Azure: Azure Site Recovery (supported features, see Managed Azure)

(c) AWS: AWS CloudEndure

(d) Storage Based Replication

(e) Software Based Replication (Zerto, SRM)

Based on the Client's requirements, there are a number of different strategies that can be applied:

(f) Active-Active

(g) Active-Passive

4 Supported Disaster Recovery Options

Only the following DR options are supported:

(a) Hypervisor-based virtual replication DR for specified hosts

(b) Storage-based replication technology for DR

(c) Application based replication

For all of the above supported technologies, NTT will advise on the following:

(d) Supportability of proposed solution

(e) Supported technology to achieve stated Client requirements (e.g., RPO/RTO)

(f) Supportability of proposed DR process

5 Client Specific Responsibilities

(a) Software, licensing or use rights

(b) Any task requiring physical access

(c) Anything not explicitly identified as In Scope in the SOW

(d) Non production environment and any environment not specified in the SOW

(e) Any rights, public cloud access or otherwise that is reasonably necessary and said same must be granted to NTT

(f) In an actual DR scenario the Client is responsible for declaring a disaster

(g) In an actual DR scenario Client is responsible for any network or DNS changes required to route user access to DR site

(h) Client will validate and verify user access to applications and data in-scope for DR

(i) Coordination and scheduling of any non-NTT resources including but not limited to Client staff, facilities and partners as identified in DR Test Plan

6 Disaster Recovery Planning

NTT will contribute to the disaster recovery planning, working with Client to document to the following:

(a) Definition of what constitutes a disaster

(b) A detailed inventory of the Client Solution which identifies the components that are in scope for failover in the event of a disaster; this includes the priorities of each solution component and the actions to be taken by NTT and the Client in the event of single or multiple component failures within the primary environment

(c) Recovery Time Objectives (RTO), Recovery Point Objectives (RPO) & Recovery Time Actual (RTA)

(d) Recovery plan testing and maintenance

(e) Recovery team organization and communications plan

(f) Failover and rollback procedures

Based on the inputs gathered during Disaster Recovery Planning, NTT will develop a **Disaster Recovery Test Plan** that will describe the technical process for implementing the DR Test across all related components of the Client solution.

7 Disaster Recovery Testing

To ensure that the Disaster Recovery environment will perform as designed in the event of a primary environment failure it must be regularly tested. As part of project implementation, NTT will perform an initial DR Acceptance Test and thereafter, regular annual DR Tests.

(a) **DR Acceptance Test**: A DR test is performed *before* the DR environment is deemed suitable for use in the event of a disaster and before the platform goes live. The DR Acceptance Test is coordinated by NTT's Service Architect to fully validate the DR Test Plan and the DR Design. In the event that a DR Acceptance Test is not possible due to the Client's availability, project timeline or other constraints, the first Annual DR Test shall act as the DR Acceptance Test.

(b) **Annual DR Test:** a scheduled and controlled temporary failover from the Client's primary environment, to a secondary or "DR" environment to test its validity and proper functioning in case of a real disaster.

NTT supports two (2) types of DR Tests:

Test Type	Production Affected	Details
Bubble Test	No	. Servers are brought up inside a non-routed VLAN (isolating the network from all other networks) . Production is not affected during a bubble DR test - No servers are shutdown during the test . Only servers inside the specified network subnet are available inside the bubble during the test . NTT coordinates with the Client to select a date for the test and ensure required resources are available (there is NO impact to production facilities or systems during the test) . The scope of testing is limited compared to a full test (printing, scanning, interfaces are not available, no other applications are aware the bubble is 'live') . When DR servers are available, Client is notified to complete their test plans **No data is brought back from DR** to production after the test is complete
Full DR Test	Yes	• NTT coordinates with the Client to select a date for the test and ensure required resources are available (facilities are shut down during the test) • All production systems are shut down during the test • All services during the test are available (printing, scanning, interfaces, etc.) • Interfaces to other applications are still using Live Production data (this requires coordination with system owners so that data is not moved into Production from other interfaced systems) • When DR systems are live the Client, resources at facilities, and any partners that are part of the test complete their test plans • After testing is complete, Production systems are brought back online • **No data is brought back from DR to Production** after the test is complete

7.2 Disaster Recovery Test Procedures

As will be detailed in the DR Test Plan, the procedures for the DR Acceptance Test and a standard Annual DR Test will follow the guidelines below:

Task	Description	DR Acceptance Test		Annual DR Test	
		NTT	The Client	NTT	The Client
Identify Resources	Allocate required resources and provide contact information, including the owners of each task		C	A,R	C

Set Maintenance Window	Agree to a date and time for executing the agreed DR Test Plan with the assumption below: · DR Acceptance Test, always considered in Business Hours · Annual DR Test, can be considered Outside Business Hours	R	C	A,R	C
Go/No Go	Lead the communication of go-no go calls with the Client prior to the test	A,R	C	A,R	C
External communication	Lead the communications with the Client during the test	A,R	I	A,R	I
Internal communication	Lead and coordinate all the internal Engineering teams during the test	A,R	I	A,R	I
Execute Master DR Test Plan	Execute NTT "DR Test Plan" and delegate any tasks to the Client as required	A,R	C	A,R	C
Test Results	Report the test results via a single ticket including success/failure results, incidents, technical and documentation improvements and/or recorded changes.	A,R	I	A,R	I
Client Testing	Perform business functional testing within the agreed maintenance window	C, I	A,R (Live or Test Data)	C, I	A,R (Live Data)
Stop Testing/Rollback	If deemed necessary, the DR test may be stopped and rolled back to the previous state at any given moment if mutually agreed by the Client and NTT;	A, R	I	A, R	I
Test Completion	Agree when the DR Test is complete and can be formally closed. Normal services operation will resume including the resolution of any outstanding Incidents that were in progress prior to the test, or that were a direct result of the test;	A, R	A	A, R	A
Final Reporting	NTT will produce a DR test report detailing the timeline, results, open incidents, and any outstanding technical service improvement items, or changes to documentation.	A,R	I	A,R	I
Service Improvement Plan	Follow up of these remediation tasks and manage any necessary escalations to resolve issues which may have occurred during the test, if required.	A,R	I	A,R	I

Note: If during the DR Test, tasks which are out of scope of the DR Plan are requested by NTT, such tasks will be processed following the standard Change Management process in the Client Service Description.

7.3 Disaster Recovery Scheduling

(a) **DR Acceptance Test (when applicable):** Unless stated otherwise in the Statement of Work (SOW), NTT will allocate resources to execute DR Acceptance Testing for one business day. Any additional resources requested by the Client will be subject to review and may be subject to additional charges.

(b) **Annual DR Test:** NTT will do its best to accommodate the Client requested test date and maintenance window, however it is subject to NTT's agreement.

7.4 Annual DR Test Success/Failure Criteria

(a) **Success criteria:** the Annual DR Test will be considered successful if the Components defined in the Disaster Recovery Plan as in-scope for failover are made available in the secondary environment and pass NTT standard availability checks of the in-scope items of management.

(b) **Failure:** the Annual DR Test will be considered to have failed if the Components defined in the Disaster Recovery Plan as in-scope for failover are not made available in the secondary environment or do not pass NTT standard availability checks of the in-scope items of management. If any failure of Components can be retested at a later date in isolation, without the need to perform another full DR test, then such failures may be later reclassified as a success.
Failure of the Client's functional tests will not be considered as failure of the DR test. The inability of the Client to connect to the secondary environment for reasons outside of NTT's control, shall not be considered a failure of the DR test.

(c) **Re-test:** If the Client requests that a DR Re-test needs to be performed then such testing may be subject to additional charges, unless the Re-test is required due to a failure which is within the scope of NTT's responsibility.

8 Limitations

The following limitations apply:

(a) By default, only the production environment, as defined in the DR Test Plan and the SOW, is in scope for the DR Acceptance Test and Annual DR Test.

(b) NTTs' standard DR test does not include the simulation of any hardware or software failure that may introduce a material risk to the reliability or supportability of the Client Solution. Furthermore, NTT will not be held accountable in the event that the Client, in order to simulate a failure of the solution, engages in activities which include, but are not limited to:

(i) The manual disconnection of any cables or hardware components

(ii) The disabling of any device ports including, but not limited to items such as network or firewall devices, filers, servers, or other devices

(iii) Stopping, pausing or interruption of any software or hardware required for the availability and proper functioning of the solution (other than as planned as part of a DR Test)

(iv) The stopping, pausing or interruption of any software or hardware replication between or within any of the sites that are required for the consistency of data and cross site replication

In cases where NTT must perform troubleshooting due to any issues caused as a direct result of the above, such activity may be subject to additional charges. Additionally, NTT reserves the right to perform an inspection of the solution prior to any 'failback' to the production environment. The time incurred for the inspection and for corrective actions or changes required to re-align the systems and services as deemed necessary by NTT, may be subject to additional charges.

8.2 Service Level Limitations

NTT will design and build a disaster recovery solution to meet Client's requirements. In some cases, Client requirements and/or technical constraints outside the control of NTT may not allow for standard RTO and RPOs to be met. Some, but not all of the factors that affect achievable RTOs and RPOs are:

(a) Cloud environment (NTT, AWS, Azure, GCP)

(b) Geographic distribution / regional constraints

(c) Network connectivity / bandwidth

(d) Volume of replicated data

(e) Replication technology

See Statement of Work for applicable RTO and RPO service level targets.

9 Tasks Included in the Standard Transition

As part of the Service, only the following tasks are associated with the setup of a Disaster Recovery environment:

(a) Setup and configuration of all components of secondary environment

(b) Replication method configuration

(c) Replication monitoring configuration

(d) Perform the DR Acceptance Test according to the technical steps in the DR Plan (See Disaster Recovery Testing section below for more details)

As part of the Service, only the following tasks are associated with the management of a Disaster Recovery environment:

(e) Monitoring 24x7 of systems as described in the applicable service descriptions defined as in-scope in the Statement of Work (i.e., Managed Operating System, Managed Private Cloud, etc.)

(f) Any Incident affecting the replication methods, or the availability of the DR site Components will be addressed 24x7 to ensure the DR availability

(g) Any changes in the production environment will be replicated in the DR site to ensure consistency

10 Tasks not included

(a) Testing of the Client disaster recovery remote sites and/or their connectivity to the secondary environment

(b) Restoration of backup data as part of the DR test

(c) Any task requiring physical access

(d) Software, licensing, or use rights

(e) Anything not explicitly listed as in scope in the SOW

NTT will not consider the Client functional test failures as Incidents or as a failure of the DR Test. Any functional test failures will be added to the DR test report and managed as service improvement items as long as they are within the scope of management.