

REPLACEMENT OF CORPORATE ICT DATA STORAGE FACILITIES

Submitted by: Executive Director Resources & Support Services

Portfolio: Communications, Transformation and Partnerships

Ward(s) affected: Non specific

Purpose of the Report

To seek Cabinet approval for the procurement of replacement networked data storage devices within the ICT corporate infrastructure.

Recommendation

That ICT undertake a procurement exercise to source replacements for the existing end of life SANs to take advantage of the benefits detailed in the report.

Reasons

The devices within the Council's current Storage Area Network (SAN) in some cases are approaching their tenth year of service and in December 2012 four will reach the end of their extended operating life and will no longer be supported or maintained by the supplier. In addition, the capacity of the current SAN is reaching a critical level.

1. Background

- 1.1 The Council's Storage Area Network (SAN) is a dedicated network that provides access to consolidated, data storage and has been in place for nearly 10 years. SANs are primarily used to make storage devices, such as disk arrays¹, accessible to servers so that the devices appear like locally attached storage to the operating system. This in effect means that when users' access and store data back they are not subject to the restrictions normally associated with single disk PCs or servers.
- 1.2 The Council has benefited from the many advantages that a SAN brings for a number of years. These include reliability, efficiency, high speed performance and increased resilience in a disaster recovery situation.
- 1.3 The demand for data storage has never been greater, with notable increases in the storage of electronic scanned documents to support the Council's channel shift ('digital by default'), agile working programmes and regulatory standards for data retention.
- 1.4 To further increase efficiency and cost effectiveness, the SAN stores data in 3 tiers. This ensures that data resides on the most cost-effective disk and that data is matched to its access requirements. In effect this means that tier 1 contains data where speed of access, reliability, high-performance and fault-tolerance is essential and is therefore used for critical business applications. This tier attracts the highest cost. Conversely, tier 3 contains data that needs to be retained over a long period but is rarely accessed, such as archived e-mail, and is low cost storage.

¹ A disk array is a disk storage system which contains multiple disk drives.

2. **Issues**

- 2.1 The devices within the Council's current SAN are in some cases approaching their tenth year of service, and in December 2012 four will reach the end of their extended operating life. Whilst this will not cause an immediate problem it will place the Council at an increased level of risk from device failure. Two of these devices are within tier 1 of storage and the remaining two are within tier 3. When the devices reach their end of life, support for them will cease. As a consequence of not being supported, the supply of spare parts will not be maintained and further software updates to ensure they remain compatible with the latest operating system technology will not be provided.
- 2.2 SAN technology has moved on since the original purchase, and the capacity of current disks is much greater. Within the SAN, all of the physical hard disks must be the same size and type and drives which were common place 10 years ago are no longer available.
- 2.3 SANs use complex software to allocate storage space and facilitate disk access. Maintaining compatibility between the various components of the authority's physical and virtual infrastructure along with the storage area network is crucial. Failure to do this would limit the Council's capacity to improve its infrastructure and software, which in turn could be detrimental to our compliance with Government data security standards.
- 2.4 The capacity of the SAN is now reaching a critical level. Overall, the Authority's storage requirements have increased by approximately 8 terabytes per year over the past 2 years. Currently, the SAN only has 7 terabytes of storage capacity left and whilst activities such as e-tidy Fridays have helped to stem this growth, the increase in storage of images, sound and video will add further pressure to the existing capacity. This problem is not unique to this council and is currently a consideration for most companies and local authorities across the UK. Innovative moves by ICT are being considered over the next 12 months to manage the level of storage growth, but in all scenarios additional storage is going to be required.

3. **Options Considered**

3.1 **Option 1: Do nothing**

- 3.2 Four of the existing SAN devices will reach their end of life by December 2012. Doing nothing places the authority at increased risk of data loss for the following reasons:
 - (1) The current SANs have a recovery capacity without data loss if up to 2 disks fail. Within 12 months of going end of life, current statistics show that it is highly probable that more than 2 disks will fail and require replacement. ICT may not be able to guarantee a source of replacement disks, given the age and type. There is therefore a high risk of data being lost as the entire disk array will become inoperable. This becomes a serious issue for critical data stored as tier 1.
 - (2) Updates for our end of life devices will stop in December which means that any future compatibility issues between physical/virtual² servers, hosts and virtual PCs will not be resolved by the suppliers. This will limit the Authority's capacity to move forward and our compliance with aspects of Government security standards.
 - (3) Our increasing reliance on virtualised servers and PCs which do not have their own storage will mean increased demand for SAN transactions. The current SAN devices in tier 1 are already at the limits of their capacity and introducing further demand will

² The Council has a small number of powerful physical servers i.e. hardware, with each supporting large numbers of smaller virtual servers and pcs.

slow access to data down for all users. This has a 'snowball' effect in that when a system begins to run slowly, demand increases which further exacerbates the problem.

3.3 Option 2: Revert to directly attached storage

3.4 Within this option, data stored on the existing end of life SAN devices would be moved to physical, directly attached storage. Each server would have dedicated storage directly attached to it, localising storage requirements in a similar way to how most commercial PCs work.

3.5 This option has the following limitations:

- (1) Storage capacity is physically limited by the maximum the disks attached can hold. Any expansion to increase disk capacity would result in user down time. This does not currently happen, as the SANs provide dynamic expansion.
- (2) Speed of access is reduced. In high demand environments such as Virtual PC disk servers, a slow disk can cause considerable issues and system performance can be dramatically impeded.
- (3) Reliability is reduced as a single point of failure is introduced to the whole system.
- (4) Disaster recovery capability is reduced as the storage device is physically attached to a particular server. Should a server fail, access to the attached storage medium also fails.

3.6 Option 3: Utilise "Cloud"³ storage

3.7 Cloud storage is currently an area of intense activity and development. Within this solution, user data is stored on a number of externally hosted servers provided by a third party. This has the potential advantages of reducing storage costs and high availability.

3.8 Whilst the cost of using a cloud based service continues to fall, it does have some limitations:

- (1) Cloud storage is currently not compatible with certain Government security standards that the Council needs to comply with.
- (2) Cloud storage is internet based and would require a very fast internet connection. The Councils' current internet provision is under review but at the current time fast access, transfer and retrieval of essential data cannot be guaranteed⁴.

3.9 Option 4: Procure replacement SAN devices

3.10 ICT would undertake a procurement exercise to source replacements for the existing end of life SANs. ICT would additionally further develop the tiered storage system currently in place and procure two high performance SAN units for tier 1 storage and two cheaper, high capacity devices to enhance the tier 3 storage.

3.11 The new SANs would offer faster response times than the devices they replace and overall produce an increase in the capacity of the Council's storage system to meet the next three years of predicted data growth.

³ A service that allows customers to save data by transferring it over the Internet or another network to an offsite storage system maintained by a third party.

⁴ Minimum current costs for equivalent Cloud Storage is £75.5k per year, rising to £330K per year for 'resilient' data. Source: Government Cloud Store (part of the Government Procurement Service)

3.11 In this option, the intent would be to redistribute the end of life SAN devices for use within the Council's disaster recovery centre at Kidsgrove to maximise the investment made in them. Using these devices only in a disaster recovery situation is likely to result in an extended lifespan, as disk demand would be lower and speed would not be an immediate issue as fewer core systems would be reliant upon their service.

3.12 Key considerations for this option are:

- (1) Replacement devices will need to be compatible with the remaining SAN hardware. There is a high satisfaction level with the current hardware, with devices (on average) going end of life 5 years after the last device is sold. The most recently purchased SAN is less than 3 years old and is still a current product, giving the overall system a considerable remaining service life.
- (2) The procurement of faster, higher capacity devices will facilitate the Council's continued data growth and further expansion of the Council's virtual infrastructure.
- (3) Reliability will also increase as the newer SAN devices are more resilient to failure.
- (4) Replacement SANs are inevitably high cost devices due to their complexity.

4, **Proposal**

4.1 That ICT undertake a procurement exercise to source replacements for the existing end of life SANs as detailed in Option 4 above.

5. **Reasons for Preferred Solution**

5.1 The benefits of implementing this solution are:

- (1) Improves the performance of the Council's current Virtual Server environment, ensuring that users do not experience delays and applications continue to operate as expected.
- (2) Improves the resilience of the Council's virtual server environment by providing the capacity required to ensure that in the event of a physical host failing, sufficient resources are available to continue operations.
- (3) Reduces downtime by allowing server infrastructure upgrades on the physical hosts to be done without interruption of service. Physical host can be placed in maintenance mode, during which time their virtual servers are distributed to other active hosts, resulting in no down time.
- (4) Allows for future increases in data storage.
- (5) Supports the Council's on-going programme to replace physical servers with virtualised equivalents to negate the requirement to source 'out of manufacture' parts.
- (6) Improves the performance and capacity of the virtual PC infrastructure, allowing the deployment of further virtual PC devices rather than traditional desktop and laptop PCs.
- (7) Supports the Council's Green Agenda by reducing hardware assets.
- (8) Improves the capacity of ICT to respond quickly to a disaster by deploying a greater number of essential services at the Kidsgrove DR site.

6. **Outcomes Linked to Sustainable Community Strategy and Corporate Priorities**

6.1 The proposal supports the Corporate Priority of Transforming our Council to achieve Excellence

7. **Legal and Statutory Implications**

There are none directly arising directly from this proposal.

8. Equality Impact Assessment

No adverse impact has been identified as a result of delivering this proposal.

9. Financial and Resource Implications

9.1 Indicative costs for the preferred solution are provided below:

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| (1) | 2x SAN (14tb) | £75,510 |
| | (High performance tier 1 storage, 3 years on-site support) | |
| (2) | 2x SAN (14tb) | £30,500 |
| | (High capacity tier 3 storage, 3 years on-site support) | |

Total cost **£106,010**

9.2 The solution does not attract any yearly maintenance costs.

9.3 Capital funding can be met from the ICT Development Fund which already has allocations of £70,000 (2012/13) and £40,000 (2013/14) set aside to meet planned costs for storage replacement.

9.4 Subject to approval, ICT would undertake a full procurement exercise to ensure that best value possible is obtained. ICT would also work closely with suppliers to ensure that the best combination of cost and performance is reached to meet our needs.