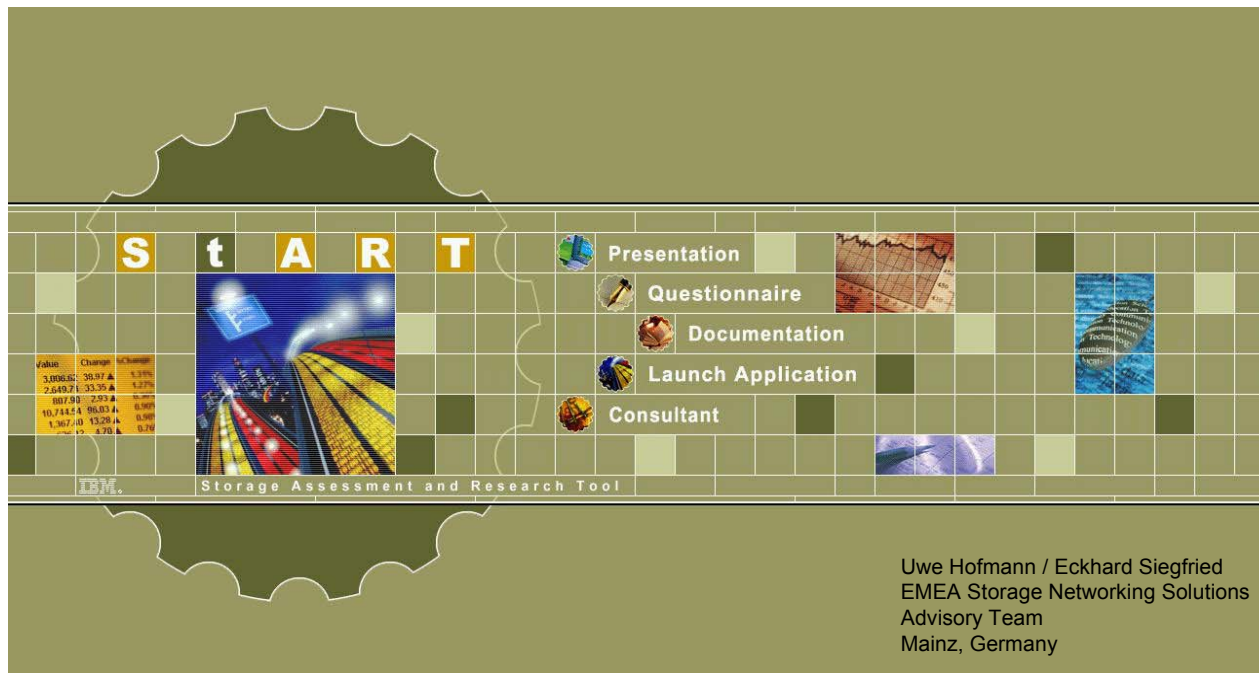


Storage Assessment and Research Tool (StART)



V 1.1.7 (09/05/2002)

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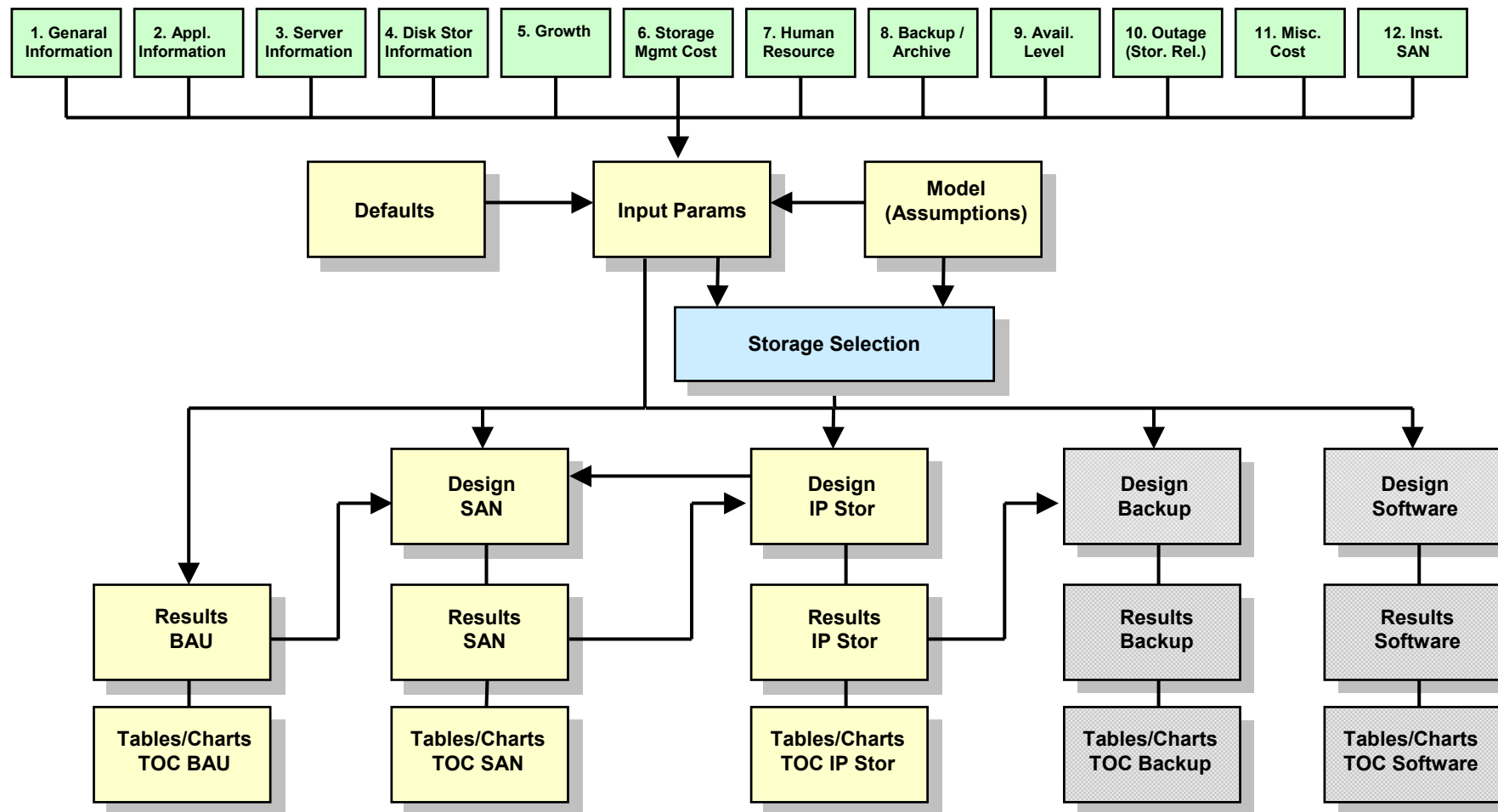
◆ IBM Sales / Alternate Sales Channels

- Development of a generic storage pre-sales support tool to leverage IBM storage revenue and improve credibility in storage solution consulting:
 - Assessment of the current customer storage environment (TCO old).
 - High Level Design and Sizing of a future Storage Network Infrastructure.
 - TCO calculation of new Infrastructure and cost comparison with TCO old.
 - Up to five year projection of potential storage cost savings

◆ Customer (IT Director, IT Operations Manager)

- Support customers to address the many issues they face when building a networked storage infrastructure
 - Storage complexity, variety of technology choices, different operating systems
 - Shortage of skilled storage administrators
 - Increased business continuance needs
 - Permanent cost pressure

StART Tool Structure



Default Values



No.	Parameter	Unit	OS/390	UNIX	Win	NetWare	AS/400
1.6	Annual price reduction	[%]	30%	30%	30%	30%	30%
1.7	Include IGF Offering		0	0	0	0	0
2.5	Performance Requirements		0	0	0	0	0
2.6	File Sharing Requirements		0	0	0	0	0
2.7	Required Implementation		1	0	0	0	1
4.2	Raid Level		5	1	0	0	5
4.3	Reserved Capacity (current)	[%]	0%	0%	0%	0%	0%
4.4	Utilisation		80%	60%	50%	50%	80%
4.5	List Price Adjustments	[%]	40%	40%	40%	40%	40%
4.6	Reserved Capacity (future)	[%]	[4.3]	[4.3]	[4.3]	[4.3]	[4.3]
5.3	Purchase cost per MB storage	[\$/MB]	0,11	0,08	0,06	0,06	0,11
5.4	Acquisition Overhead	[%]	5%	5%	5%	5%	5%
6.1	Storage Mgmt Cost Software	[\$]	0	0	0	0	0
6.2	Storage Mgmt Cost Hardware	[\$]	0	0	0	0	0
7.2	Annual Burdened Cost per FTE1	[\$/FTE]	100.000	100.000	100.000	100.000	100.000
7.3	#FTE2		0	0	0	0	0
7.4	Annual Burdened Cost per FTE2	[\$/FTE]	100.000	100.000	100.000	100.000	100.000
7.5	Annual Burdened Cost Increase		5%	5%	5%	5%	5%
7.6	Management Software Cost (Admin, Config)	[\$]	0	0	0	0	0
7.7	Cost of Recruitment	[\$/FTE]	10.000	10.000	10.000	10.000	10.000
7.8	Cost of Training/Education	[\$/FTE]	10.000	10.000	10.000	10.000	10.000
7.9	Annual Estimated Labour Turnover	[%]	15%	15%	15%	15%	15%
7.10	Annual Education/Trainign Cost Increase	[%]	5%	5%	5%	5%	5%
9.1	Availability Level (current)		0	0	0	0	0
9.2	Availability Level (future)		1	1	1	1	1
10.2	Annual Burdened Cost per User	[\$/Usr]	100.000	100.000	100.000	100.000	100.000
10.5	Planned outages: affected servers (factor)		1	0.5	0.5	0.5	1
10.6	Planned outages: avg. duration	[hrs]	4	4	4	4	4



Total Ownership Cost (TOC)



◆ TOC Components

- Hardware Costs
- Human Resource Costs
- Outage Costs
- Miscellaneous Costs

◆ Projection Period

- TOC current: Current year
- TOC future: following 3 to 5 years (selectable)
- Depreciation: linear 1 to 5 years (selectable)

◆ Projected Savings

- Comparison TOC BAU to TOC SAN+IP over projection period



TOC Business As Usual (BAU) Results

Results are given in tabular and graphical form for each given server group and as total values for the current year and the following up to 5 years on:

- ◆ **Hardware (Storage and Fabric)**

- Disk Capacity (Server Growth Rate, Disk Growth Rate)
- Hardware Cost (Disk Capacity, Disk Purchase Cost, Price Reduction, Price Adjustments)
- Storage Management Cost
- Fabric Cost for existing SAN (Fab Type, #Ports, Price Reduction, Price Adjustments)
- Server FC Host Bus Adapter Cost for existing SAN (#Server, Growth Rate, Price Reduction, Price Adjustments)

- ◆ **Human Resource**

- Number of FTEs (Managed GB per FTE, Disk Capacity)
- Human Resource Cost (#FTEs, Burdened Cost, Burdened Cost Increase)
- Recruitment Cost (#FTEs, Recruitment Cost per FTE)
- Education Cost (#FTEs, Education Cost per FTE)
- Labour Turnover Cost (#FTE, Turnover Rate, Recruitment Cost)

◆ Outage (Storage related)

- General Parameters
 - Loss Productivity (#Users, Burdened Cost per User)
 - Loss Revenue (Total Revenue, Revenue Growth, Rev. Contribution Factor, #Servers, Operation hours)
- Unplanned outages
 - Revenue related (Loss Revenue, number of incidents, avg. duration)
 - Productivity related (Loss Productivity, number of incidents, avg. duration)
- Planned outages
 - Revenue related (Loss Revenue, number of incidents, avg. duration)
 - Productivity related (Loss Productivity, number of incidents, avg. duration)
- Outage Cost for Business As Usual (Outage cost per GB , disk capacity)

◆ Miscellaneous

- Additional Hardware/Software Cost
- Environmental Cost (Default: 5% of Hardware Cost, Human Resource Cost, and Outage Cost)

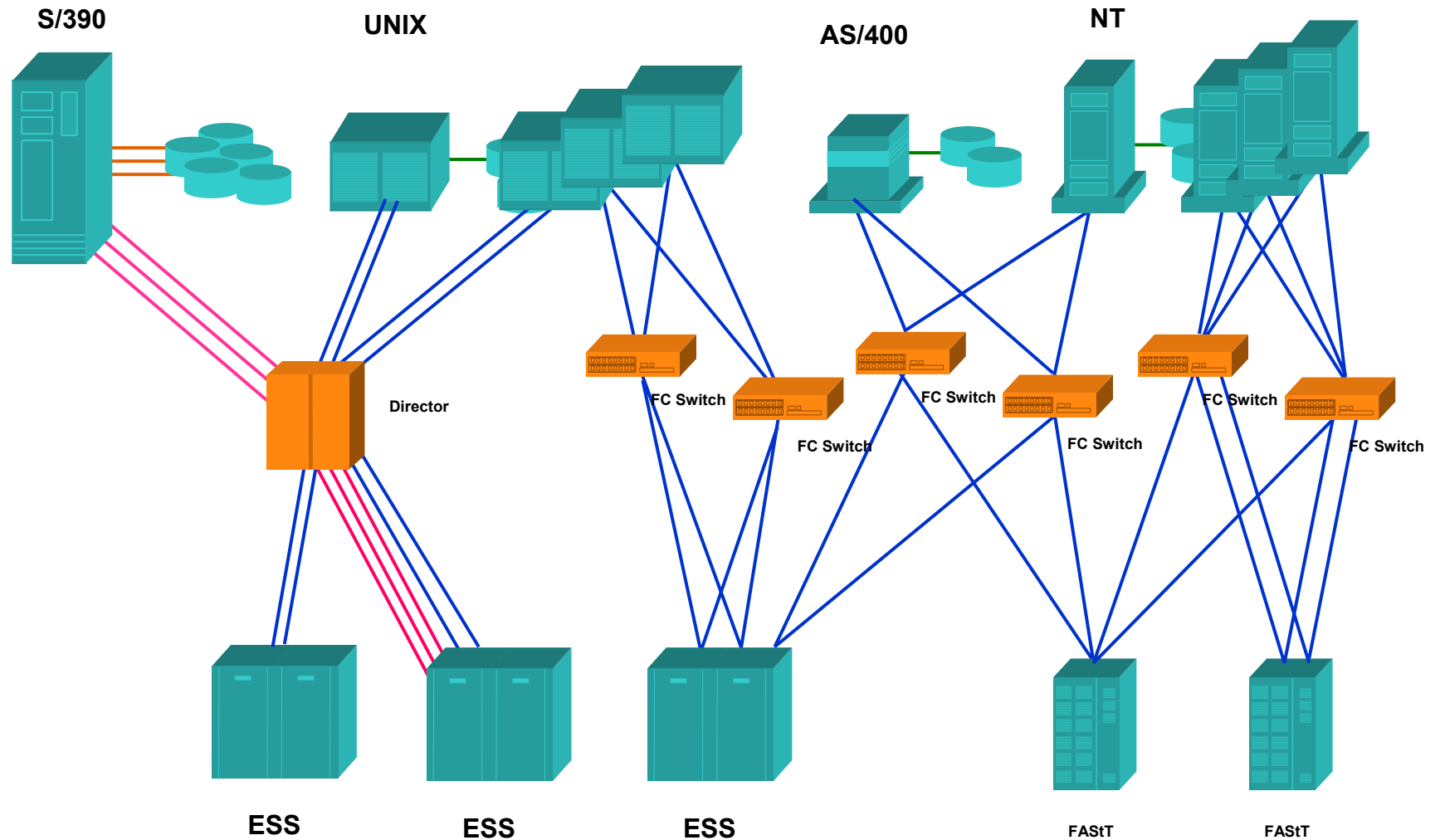


Storage Networking Design



- ◆ Based on Business as Usual (BAU)
 - Direct Attached
 - Already implemented SAN
- ◆ Decision on
 - Storage Network Type (per server group)
 - SAN and/or
 - NAS and/or
 - iSCSI
 - Storage Model (per server group)
 - SAN: ESS, ESS Turbo, FAStT500 , FAStT700
 - NAS: NAS 226, NAS 326, NAS 300G
 - iSCSI: iSCSI 210i, Cisco 5420
- ◆ Special routine for selection
 - Storage Selection Tool (StorSelect3)
 - Based on input parameters

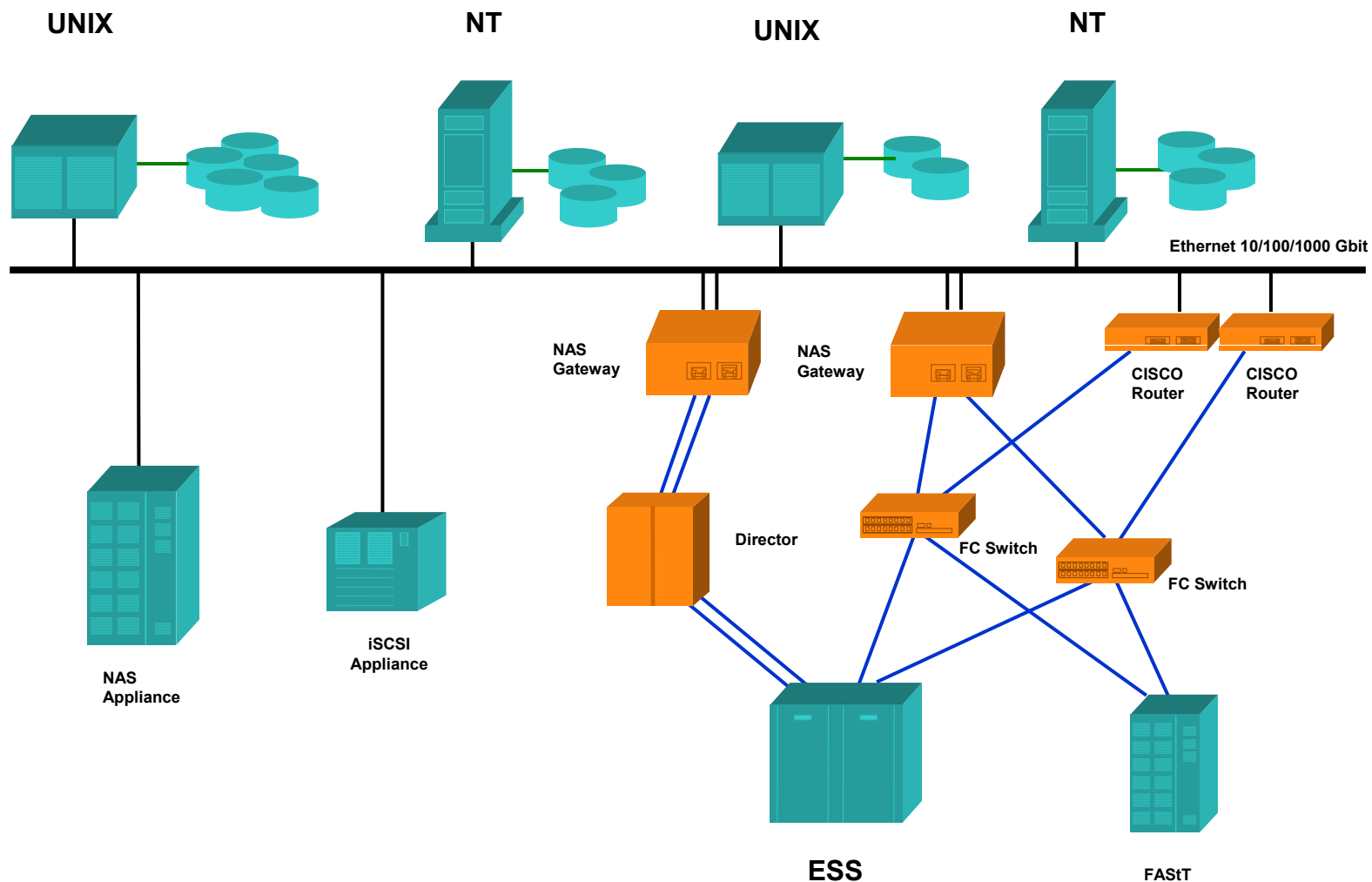
Storage Consolidation (SAN)



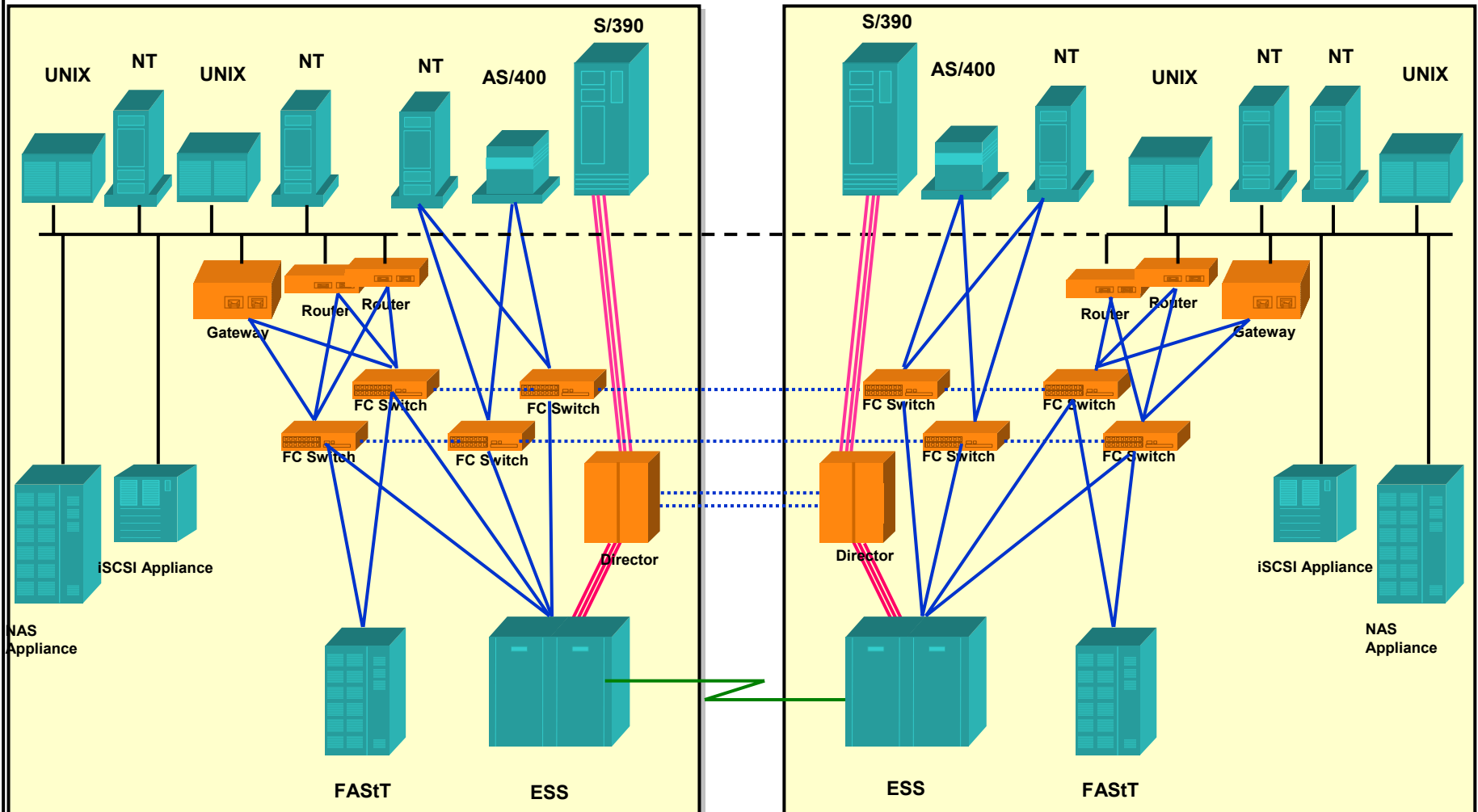
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Storage Consolidation (IP)



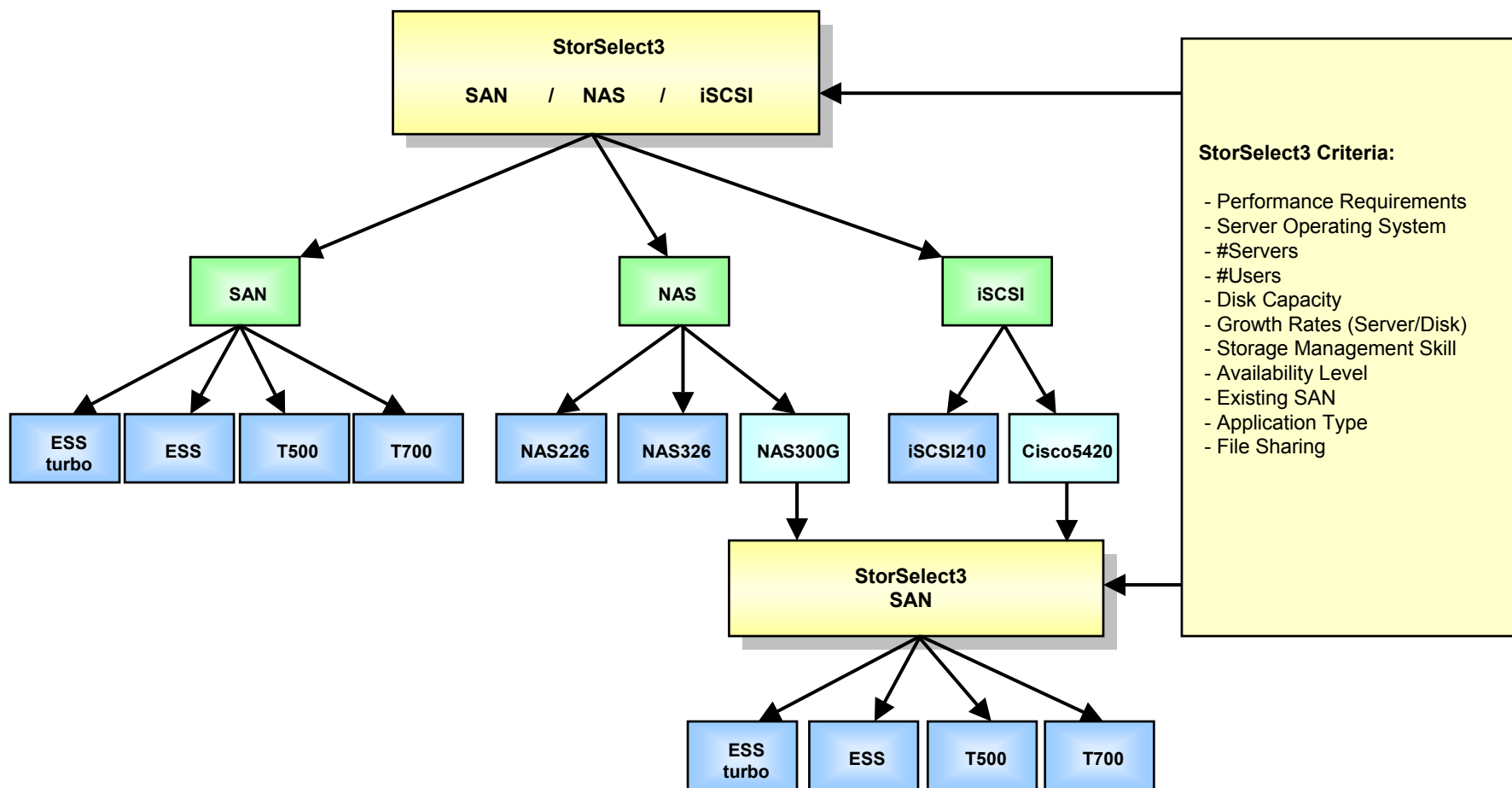
Storage Consolidation



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Storage Selection Tool (Process)



◆ Enforced Implementation

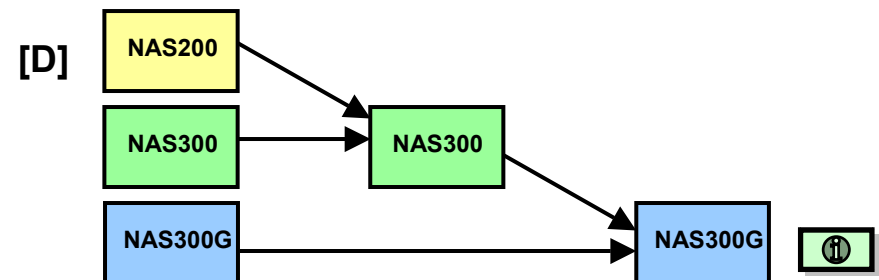
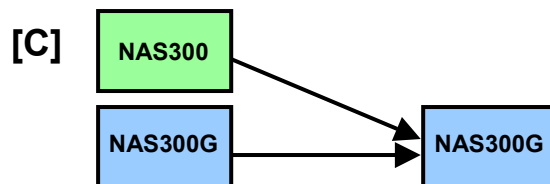
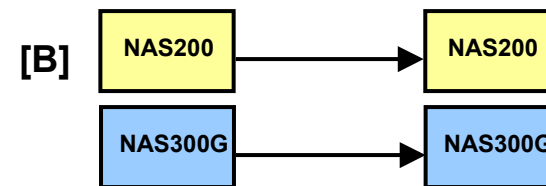
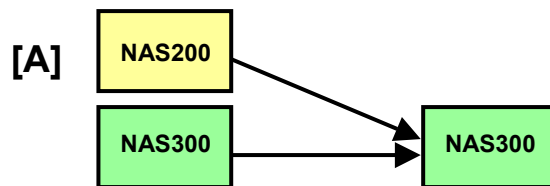
- Main implementation type can be enforced by Input [2.7]
 - 1 = SAN
 - 2 = NAS
 - 3 = iSCSI
- Model incl. implementation type can be enforced by Input [2.7]
 - SAN: 11 = FASTT500, 12 = FASTT700, 13 = ESS 14 = ESS turbo
 - NAS: 21 = NAS 226, 22 = NAS 326, 23 = NAS 300G
 - iSCSI: 31 = iSCSI 210, 32 = Cisco 5420
- In case of NAS 300G or Cisco 5420 the storage can be enforced via
 - NAS 300G: 2311 = FASTT500 2312 = FASTT700 2313 = ESS 2314 = ESS turbo
 - Cisco 5420: 3211 = FASTT500 3212 = FASTT700 3213 = ESS 3214 = ESS turbo
- If Input is given as a **negative** number, the consolidation rules will **not** be applied (see also next foils)
- Will be checked against compatibility

StorSelect3 (NAS): Consolidation



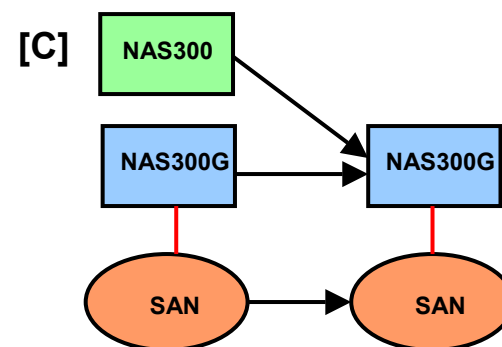
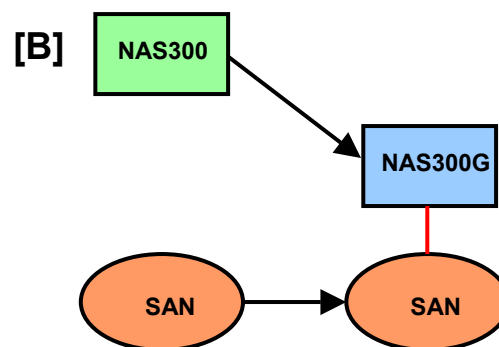
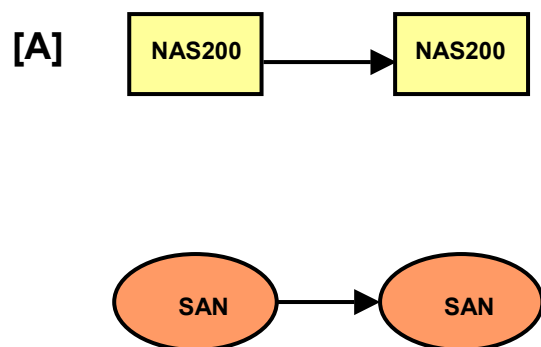
- ◆ Selection Rules (applied only if Enforced Implementation is not negative)

- [NAS-1] Rules in case if mixed model selection or enforced
 - [A] NAS 200 / NAS 300 -> consolidate NAS 200 into NAS 300
 - [B] NAS 200 / NAS 300G -> no further consolidation
 - [C] NAS 300 / NAS 300G -> consolidate NAS 300 into NAS 300G
 - [D] NAS 200 / NAS 300 / NAS 300G -> use [A] and [C]



StorSelect3 (NAS): Consolidation cont.

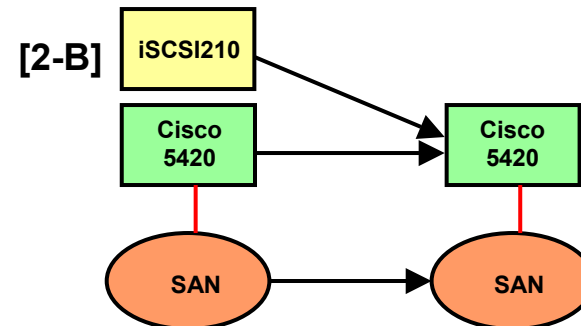
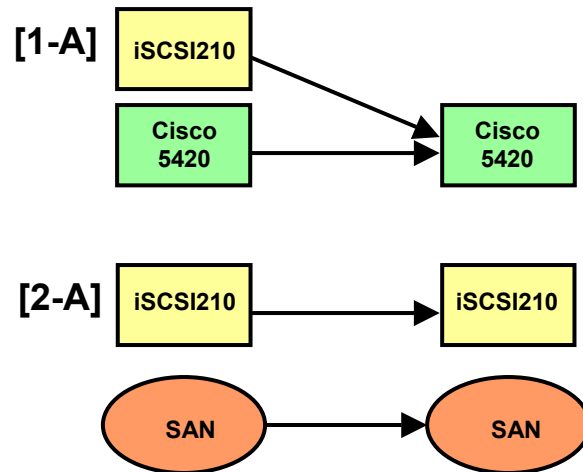
- ◆ Selection Rules (applied only if Enforced Implementation is not negative)
 - [NAS-2] Rules in case if SAN and NAS is selected or enforced
 - [A] NAS 200 -> no further consolidation
 - [B] NAS 300 -> consolidate to NAS 300G
 - [C] NAS 300 / NAS 300G -> consolidate to NAS 300G



StorSelect3 (iSCSI): Consolidation



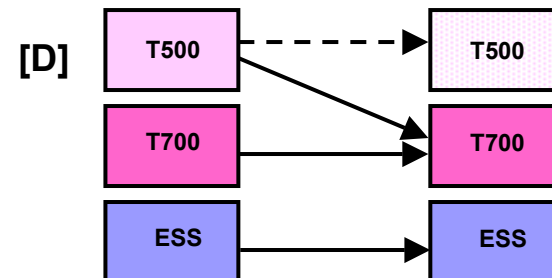
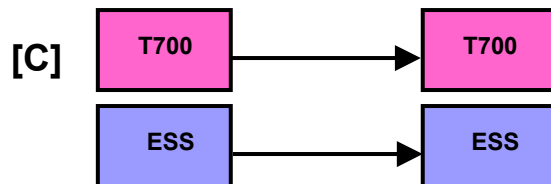
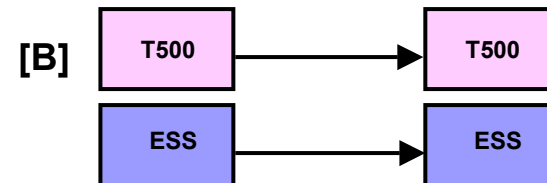
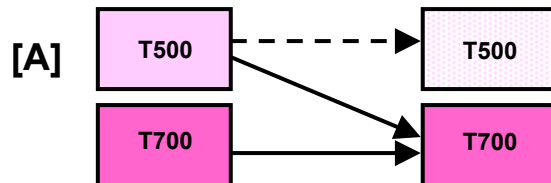
- ◆ Selection Rules (applied only if Enforced Implementation is not negative)
 - [iSCSI-1] Rules in case if mixed model selection?
 - [A] iSCSI 210 / Cisco 5420 -> consolidate into Cisco 5420
 - [iSCSI-2] Rules in case if SAN and iSCSI is selected
 - [A] iSCSI 210 -> no further consolidation
 - [B] iSCSI 210 / Cisco 5420 -> consolidate into Cisco 5420



StorSelect3 (SAN): Consolidation



- ◆ Selection Rules (applied only if Enforced Implementation is not negative)
 - [SAN-1] Rules in case if mixed model selection
 - [A] T500 / T700 -> consolidate T500 into T700 only if capacity of server groups with T700 is twice as much as capacity of server groups with T500
 - [B] T500 / ESS or ESS turbo -> no further consolidation
 - [C] T700 / ESS or ESS turbo -> no further consolidation
 - [D] T500 / T700 / ESS -> use [A]
 - [E] ESS / ESS turbo -> no further consolidation



Storage Area Network Design



- ◆ High Level Design for Storage Consolidation
 - IBM Enterprise Storage Server (ESS)
 - ESS
 - ESS Turbo
 - IBM Fibre Array Storage Technology
 - FAStT500
 - FAStT700
 - SAN Fabric Components
 - Switches (16-ports, 32-ports)
 - Directors (64-ports, 128-ports)



SAN Design: ESS and ESS turbo



- ◆ Number and configuration of ESS (for existing and new SAN)
 - Number of ESS
 - Disk Capacity, RAID level
 - #Server, Ratio
 - Storage Growth Rate
 - MaxHAs, MinCapacity, MaxCapacity, Capacity Increments
 - High Availability Requirements (Remote Copy)
 - Number of HA
 - #Server, Ratio,
 - Server Growth Rate
 - Number of ESS 8-Packs
 - RAID Level
 - Disk Capacity
 - Storage Growth Rate
 - MinCapacity, MaxCapacity, Capacity Increments
 - Type of 8-Packs
 - 72GB HDDs @ 10K rpm, 36GB and 18GB HDDs @ 15K rpm
 - ESS Cache Size
 - ESS type (ESS or ESS turbo),
 - Disk Capacity
 - Performance Requirements
 - High Availability Requirements (Remote Copy)



- ◆ Number and configuration of FAStT
 - Number of FAStT base units
 - Disk Capacity
 - #Server, RatioFAStT, RAID Level
 - Growth Rates
 - MaxHAs, MaxCapacity
 - Number of Expansion units and HDDs
 - Disk Capacity
 - #Server, RAID Level
 - Growth Rates
 - MinCapacity, MaxCapacity, Capacity Increments
 - FAStT Cache Size
 - Always maximum cache



SAN Design: Fabric Components



- ◆ Type and Number of required Fabric (for new SAN)
 - Fabric Component Type (determined by initial number of ports)
 - Server Type
 - #Server
 - Server Growth Rate
 - Ratio
 - Total Number of ports
 - #Server
 - Server Growth Rate
 - Ratio
 - Fabric Component Type (Inter Switch Links)
 - Number of fabric units
 - Fabric Component Type
 - Total number of ports



- ◆ High Level Design for Storage Consolidation
 - Network Attached Storage (NAS)
 - IBM NAS 200
 - IBM NAS 300
 - IBM NAS 300G
 - iSCSI
 - IBM IP Storage 210i
 - Cisco Router 5420

IP Storage Design: Appliances / Gateways



- ◆ Number and configuration of IP Storage (NAS/iSCSI)
 - Type and Model of IP Storage (NAS/iSCSI)
 - Storage Selection Tool (StorSelect3)
 - Number of appliance boxes (base units, expansion units, HDDs)
 - Disk Capacity (#Server, Capacity, Growth Rate, RAID level, Ratio)
 - High Availability Requirements
 - Number of Gateways
 - #Servers
 - High Availability Requirements



Results are given in tabular and graphical form for each given server group and as total values for the current year and the following 3 years on:

- ◆ **Hardware (Storage and Fabric)**
 - Storage Cost (ESS, FASTT, NAS, iSCSI)
 - Fabric Cost (Switch, Director)
 - Server FC Host Bus Adapter Cost

- ◆ **Human Resource**
 - Number of FTEs
 - Human Resource Cost
 - Recruitment Cost
 - Education Cost
 - Labour Turnover Cost

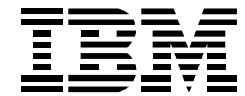
TOC SAN + IP Results (cont.)



- ◆ Outage (Storage related)
 - General Parameters
 - Loss Productivity
 - Loss Revenue
 - Unplanned outages
 - Revenue related
 - Productivity related
 - Planned outages
 - Revenue related
 - Productivity related
- ◆ Miscellaneous
 - Additional Hardware/Software Cost
 - Environmental Cost



StART: Sample Results

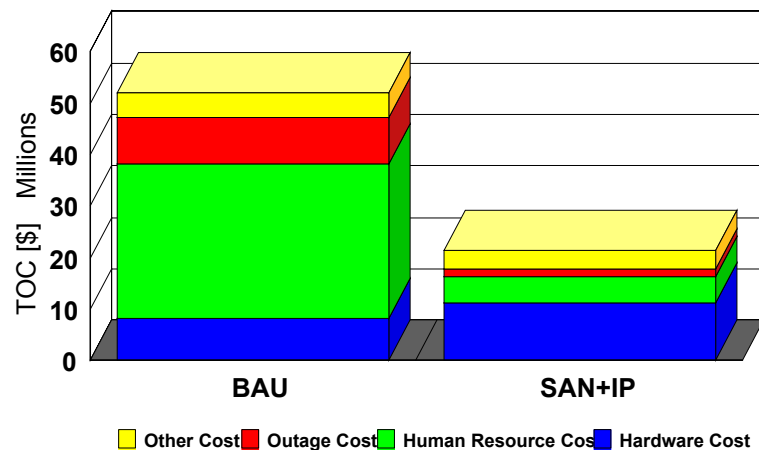


TOC [\$]	BAU	SAN+IP	Savings	%Savings
Hardware	5.075.368	7.045.637	-1.970.268	-38,8%
Human Resource	17.271.418	3.415.551	13.855.867	80,2%
Outage	8.258.872	2.828.480	5.430.392	65,8%
Misc.	1.530.283	403.943	1.126.340	73,6%
Total	32.135.941	13.693.611	18.442.331	57,4%

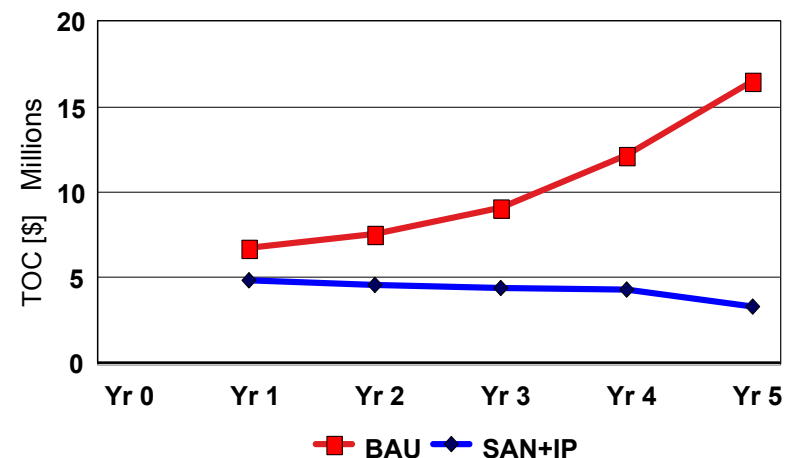
SAN/IP Configuration List:

#ESS	....	....	....	....	....
#8-Packs	....	....	....	....	....
#FAStT	....	....	....	....	....
#Gateways	....	....	....	....	....
#NAS Appl.	....	....	....	....	....
....

Sample Customer All Server Groups



Sample Customer All Server Groups



StART: Summary V 1.1.7



◆ Enhanced functions of new StART V 1.1.7 (GA 08/05/2002)

- New functions
 - Support of new ESS model 800 ("Silvertip") with two models
 - "ESS" : Silvertip with no Turbo option and 10K / 15 K rpm HDDs
 - "ESS turbo": Silvertip with Turbo option and 15K rpm HDDs
 - Support for ESS RAID 5 and RAID 10
 - New Cache Option 64GB
 - More Tiers for PPRC (Remote Copy)
 - New performance class [Q 2.5]
 - "2" = Super Performance (used for differentiation ESS vs. ESS turbo)
 - Existing RAID 1 can be enforced (default is RAID 5)
 - Add Exp700 for FASTT (replaces Exp500)
 - Selectable projection period: 3, 4, or 5 years (via buttons)
 - Selectable linear depreciation period: 1, 2, 3, 4, or 5 years (via buttons)
- Updated functions
 - FASTT and IP design now uses existing RAID level
 - AIX, HP-UX, and Sun Solaris support for FASTT 700, incl. Remote Copy functionality
 - In case of NAS 300G or Cisco 5420 the storage model can now be enforced
 - Ratios for ESS and ESS turbo changed to adopt higher CPI and HA bandwidth
 - Changing StorageSelection consolidation rules for FASTT (now capacity driven)
 - Existing non-IBM storage hardware or IBM RVA hardware can be re-utilized
 - Existing ESS and FASTT hardware will be re-utilized
- Usability
 - "About" Button to get generic information about the tool and the Lotus environment
 - "Re-Format" Button to re-format all input fields to their default format
 - "Import Data" Button to import data from second worksheet
 - "Copy to GraphsWorksheet" to copy Summary worksheet to unlock Graph worksheet
 - Buttons to copy individual graphs to the clipboard for pasting to other applications

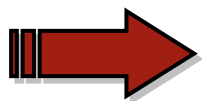
StART: Competitive Differential Advantages



- ◆ Cost Assessment ... nothing new

BUT....

- ◆ High Level Storage Networking Design and Sizing... **unique value**
- ◆ Calculation of Potential Cost Savings ... **unique value** ... exact calculation
- ◆ Ease of Use ... **minimized customer effort** ... quick response [3-5 days]
- ◆ Free of Charge... **no additional costs**



Discover Savings in Storage Consolidation !