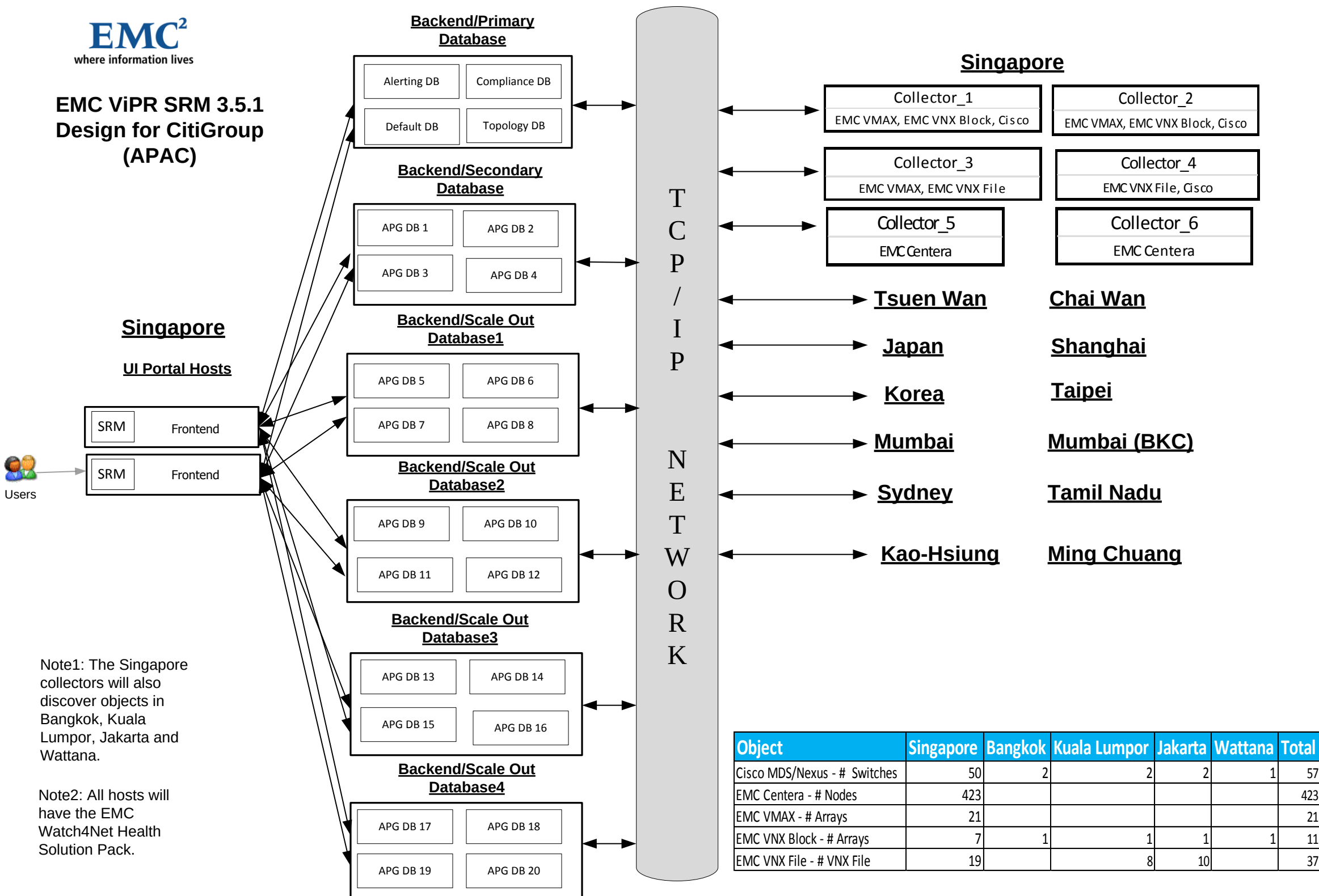
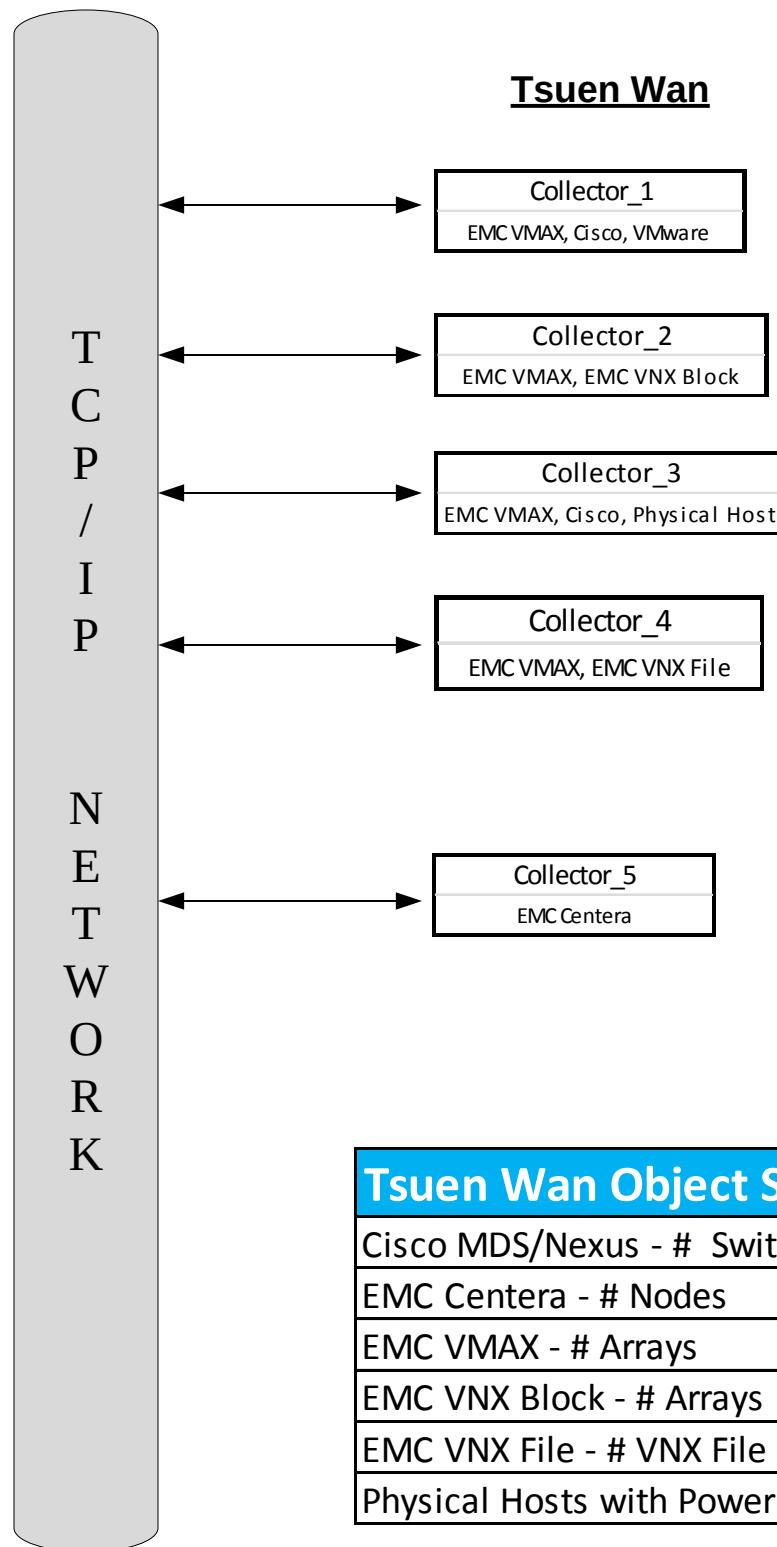




EMC ViPR SRM 3.5.1 Design for CitiGroup (APAC)



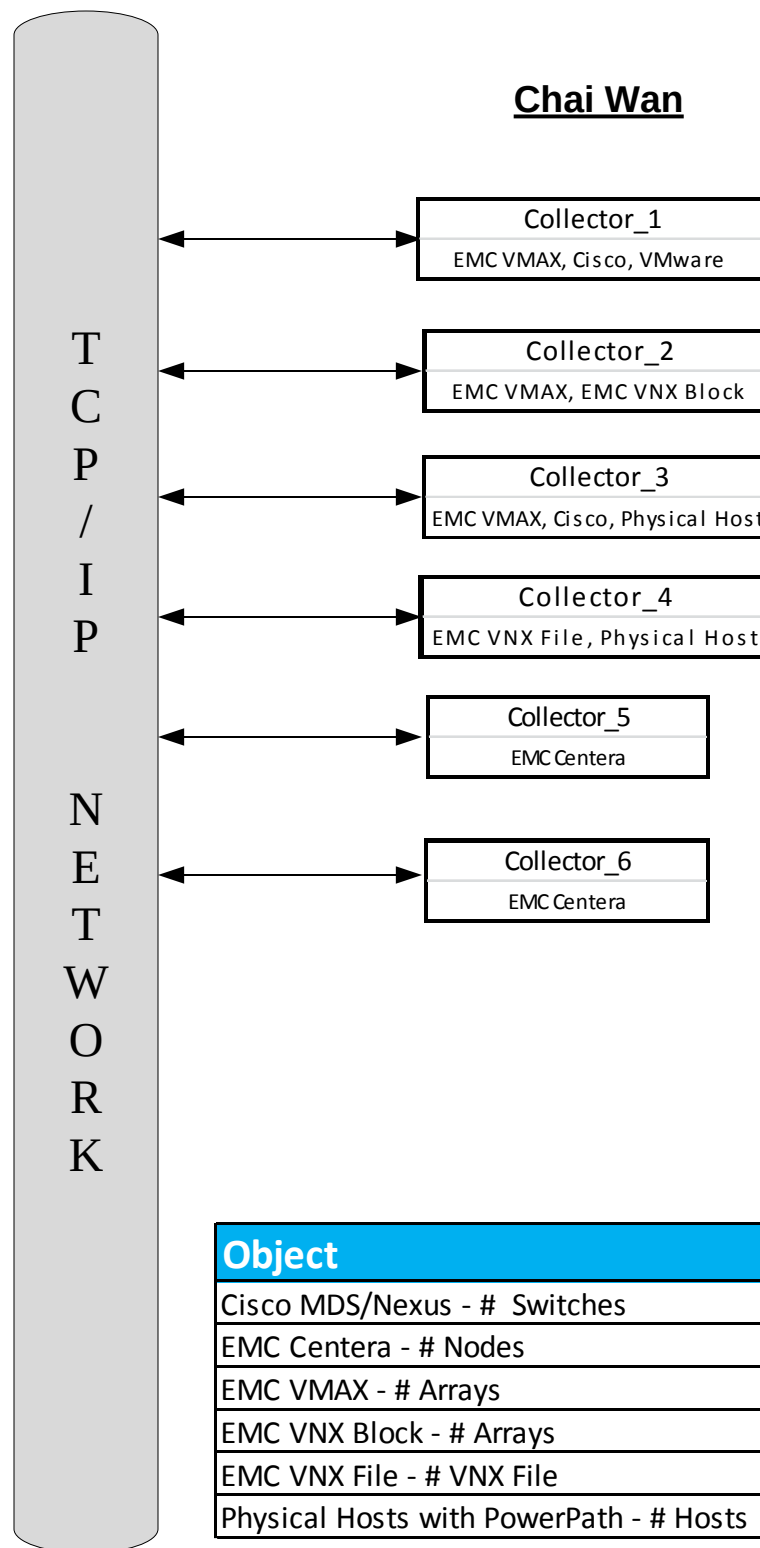
**EMC ViPR SRM 3.5.1
Design for CitiGroup
(Tsuen Wan Collectors)**



Tsuen Wan Object Summary	Count
Cisco MDS/Nexus - # Switches	22
EMC Centera - # Nodes	27
EMC VMAX - # Arrays	14
EMC VNX Block - # Arrays	4
EMC VNX File - # VNX File	9
Physical Hosts with PowerPath - # Hosts	190

Note: All hosts will
have the EMC
Watch4Net Health
Solution Pack

EMC ViPR SRM 3.5.1 Design for CitiGroup (Chai Wan Collectors)



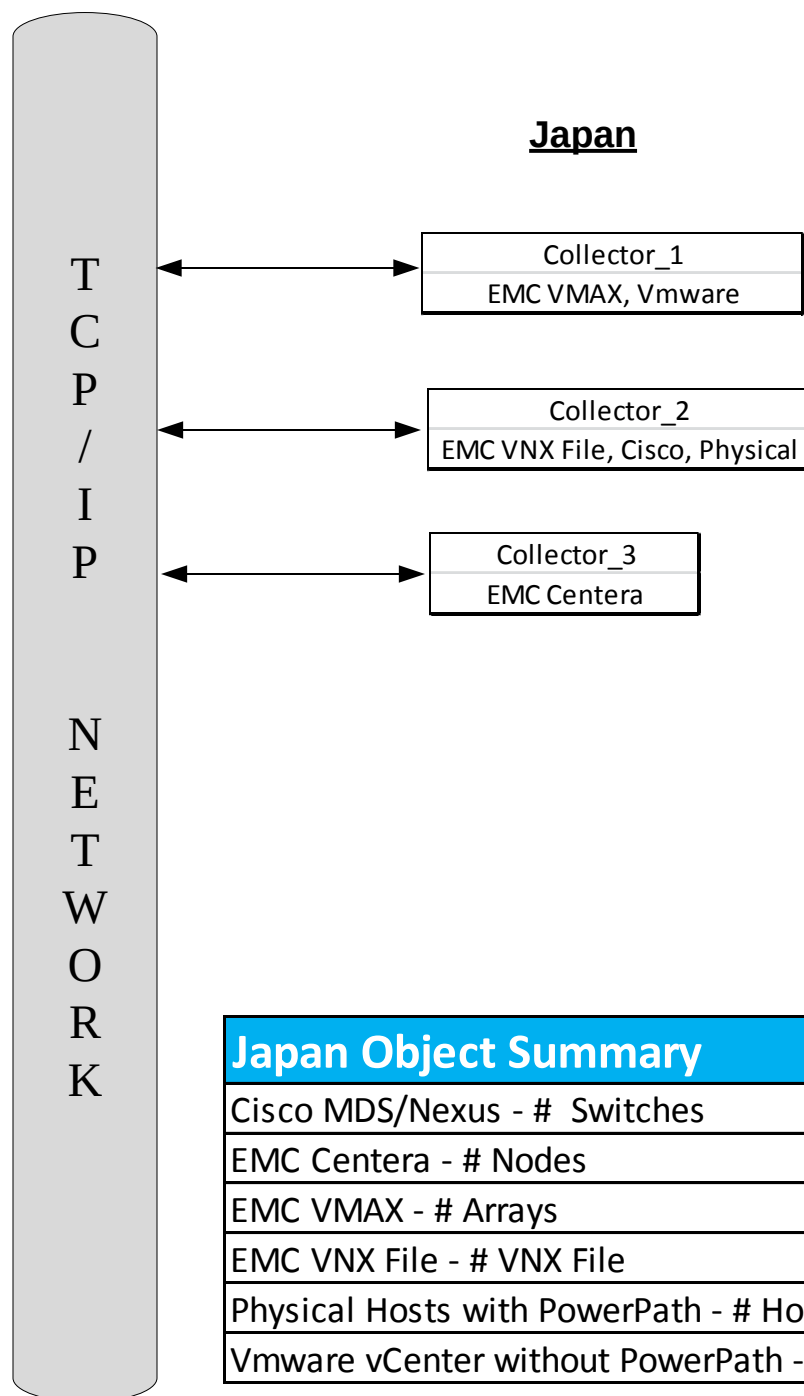
Note1: The Chai Wan collectors will also discover objects in Hunghom

Note2: All hosts will have the EMC Watch4Net Health Solution Pack

Object	Chai Wan	Hunghom	Total
Cisco MDS/Nexus - # Switches	25	2	27
EMC Centera - # Nodes	316		316
EMC VMAX - # Arrays	9		9
EMC VNX Block - # Arrays	4		4
EMC VNX File - # VNX File	6		6
Physical Hosts with PowerPath - # Hosts	1032		1032



EMC ViPR SRM 3.5.1 Design for CitiGroup (Japan Collectors)

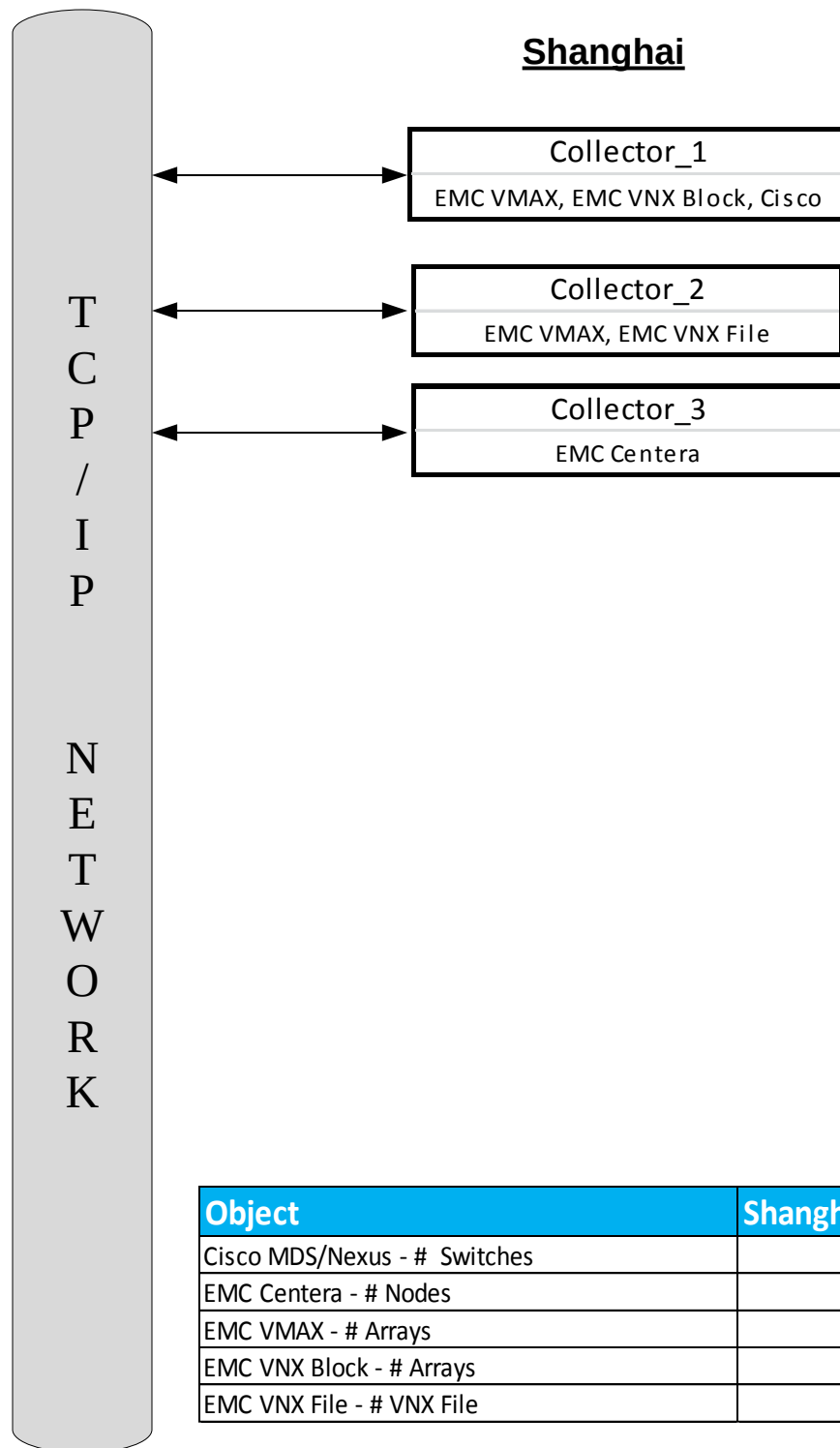


Note: All hosts will
have the EMC
Watch4Net Health
Solution Pack

EMC ViPR SRM 3.5.1 Design for CitiGroup (Shanghai Collectors)

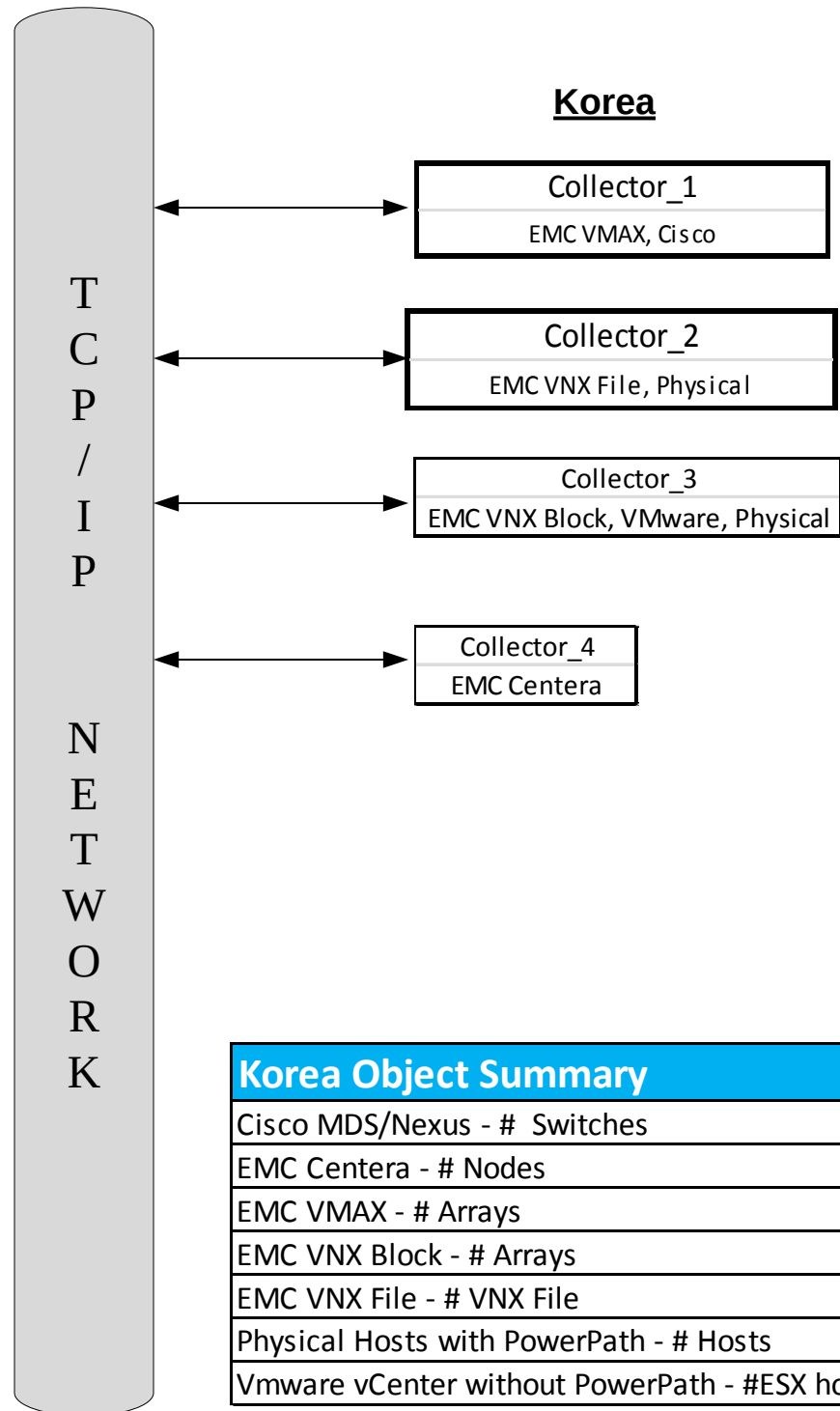
Note1: The Shanghai collectors will also discover objects in Beijing.

Note2: All hosts will have the EMC Watch4Net Health Solution Pack.





EMC ViPR SRM 3.5.1 Design for CitiGroup (Korea Collectors)

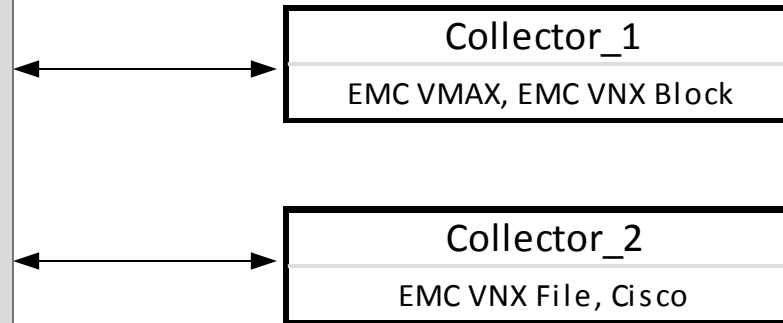


Note: All hosts will have the EMC Watch4Net Health Solution Pack.



TCP / IP

NETWORK



Note2: All hosts will have the EMC Watch4Net Health Solution Pack.

Object	Mumbai	New Delhi	Total
Cisco MDS/Nexus - # Switches	4	2	6
EMC VMAX - # Arrays	1		1
EMC VNX Block - # Arrays	1	1	2
EMC VNX File - # VNX File		2	2

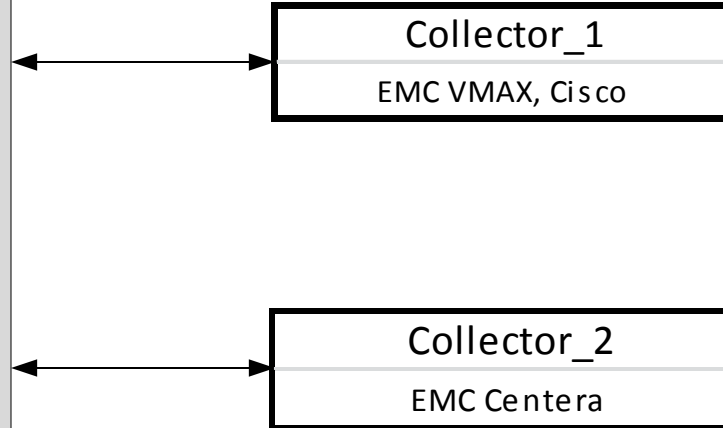


**EMC ViPR SRM 3.5.1
Design for CitiGroup
(Mumbai (BKC) Collectors)**

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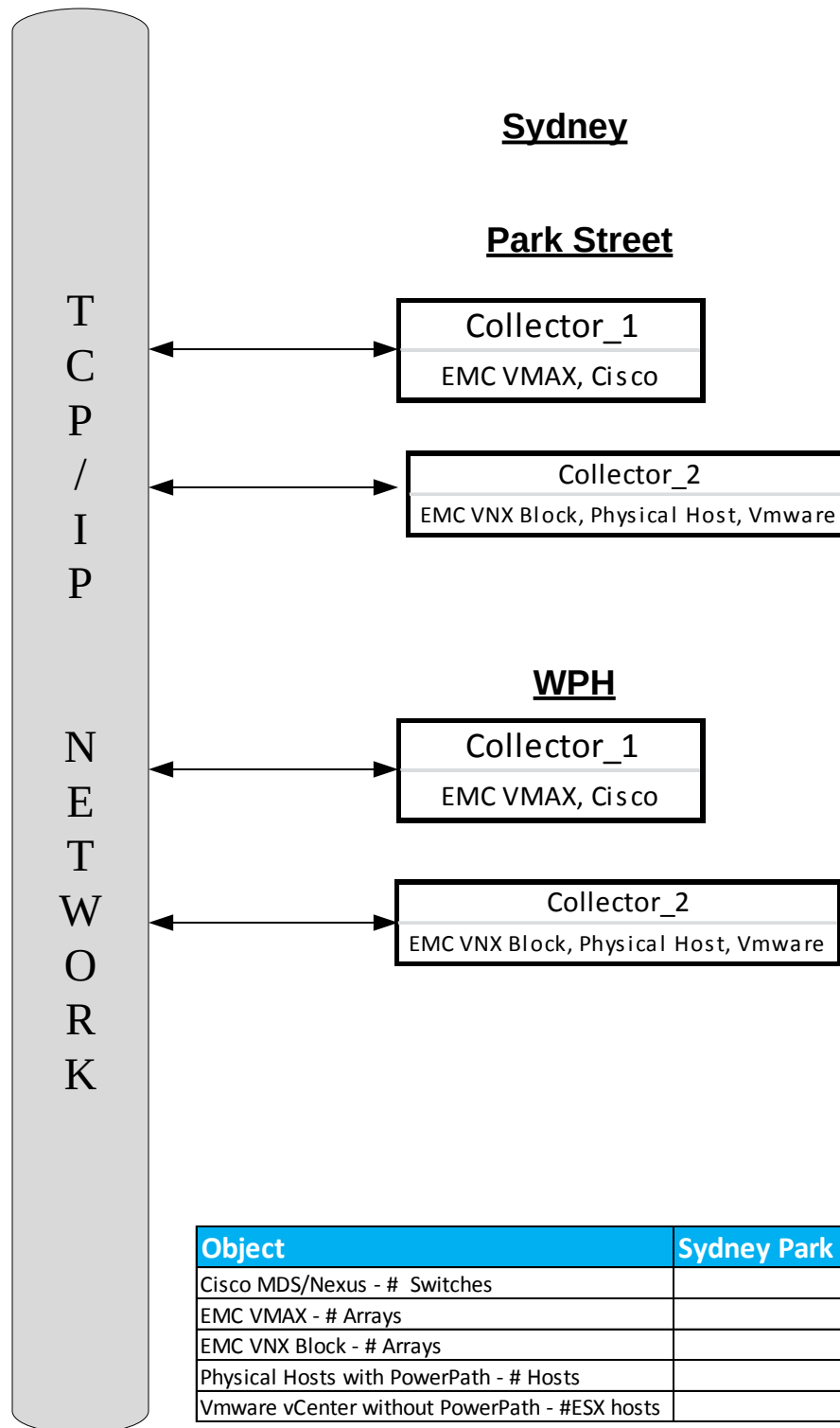
Mumbai (BKC)



Note: All hosts will have the EMC Watch4Net Health Solution Pack.

Mumbai (BKC) Object Summary	Count
Cisco MDS/Nexus - # Switches	2
EMC Centera - # Nodes	14
EMC VMAX - # Arrays	1

**EMC ViPR SRM 3.5.1
Design for CitiGroup
(Sydney)**



Note: All hosts will have the EMC Watch4Net Health Solution Pack.

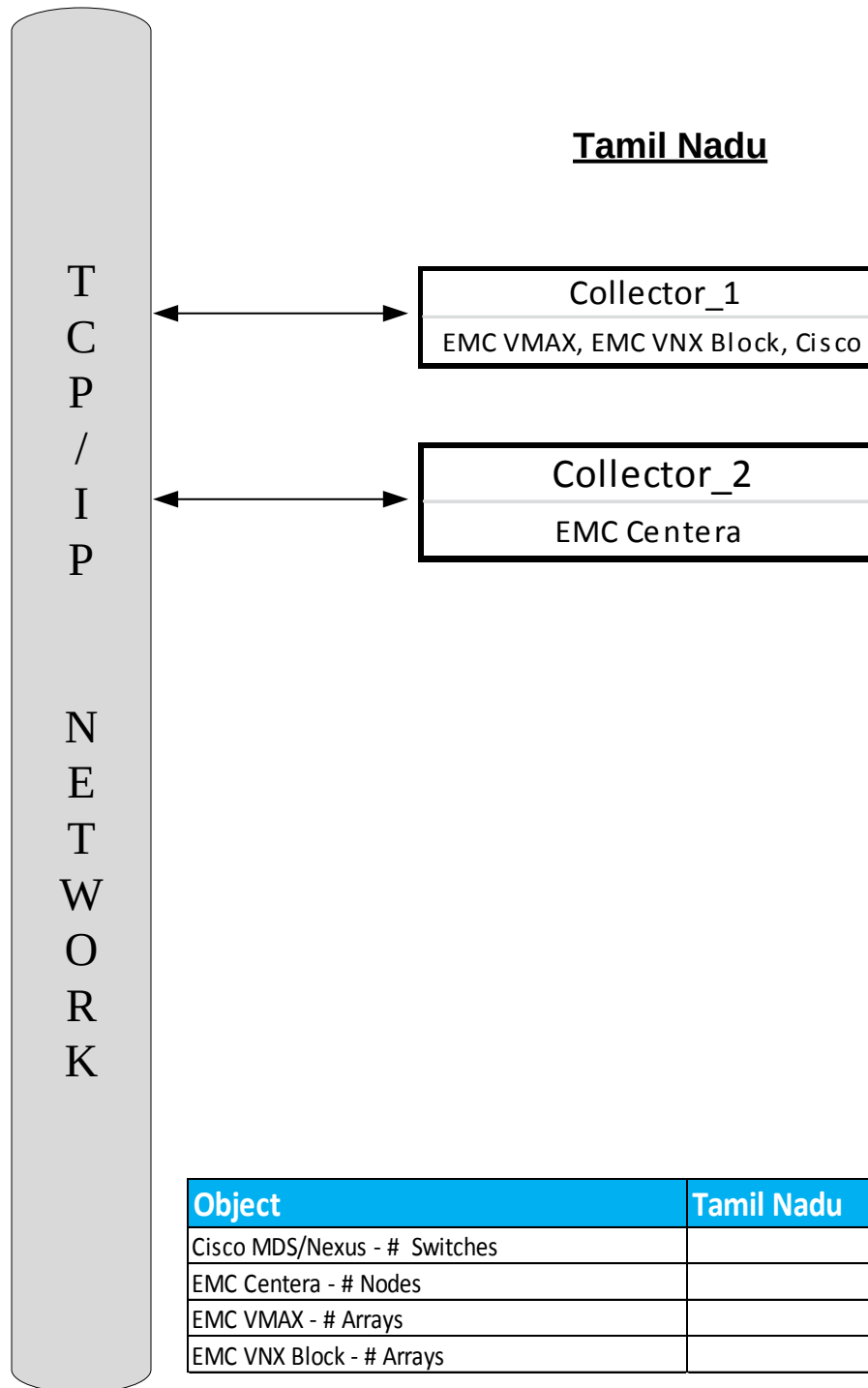
Object	Sydney Park St	Sydney WPH	Total
Cisco MDS/Nexus - # Switches	2	2	4
EMC VMAX - # Arrays	1	1	2
EMC VNX Block - # Arrays	1	1	2
Physical Hosts with PowerPath - # Hosts	54	21	75
Vmware vCenter without PowerPath - #ESX hosts	2	1	3



EMC ViPR SRM 3.5.1 Design for CitiGroup (Tamil Nadu Collectors)

Note1: The Tamil Nadu collectors will also discover objects in Chennai.

Note2: All hosts will have the EMC Watch4Net Health Solution Pack.



Tamil Nadu

Collector_1

EMC VMAX, EMC VNX Block, Cisco

Collector_2

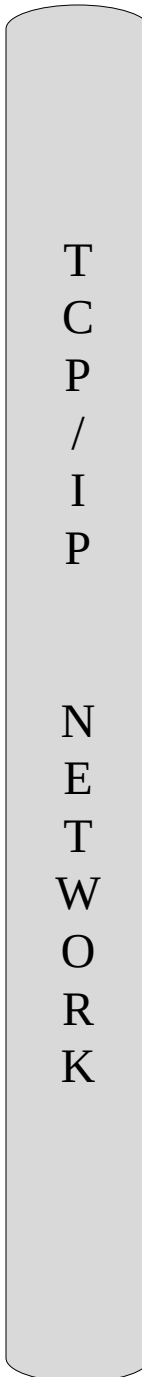
EMC Centera



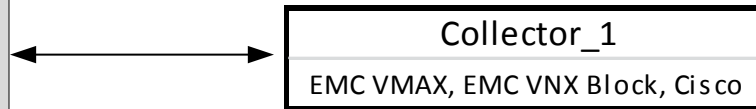
EMC ViPR SRM 3.5.1 Design for CitiGroup (Kao Hsiung Collectors)

Note1: The Kao
Hsiung collectors will
also discover objects
in Seoul.

Note2: All hosts will
have the EMC
Watch4Net Health
Solution Pack.



Kao Hsiung



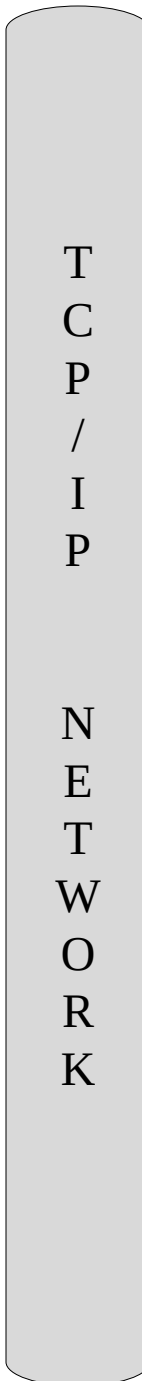
Object	Kao Hsiung	Seoul	Total
Cisco MDS/Nexus - # Switches	4	2	6
EMC VMAX - # Arrays	1		1
EMC VNX Block - # Arrays	1	1	2



EMC ViPR SRM 3.5.1 Design for CitiGroup (Ming Chuang Collectors)

Note1: The Ming Chuang collectors will also discover objects in Sung Zhu.

Note2: All hosts will have the EMC Watch4Net Health Solution Pack.

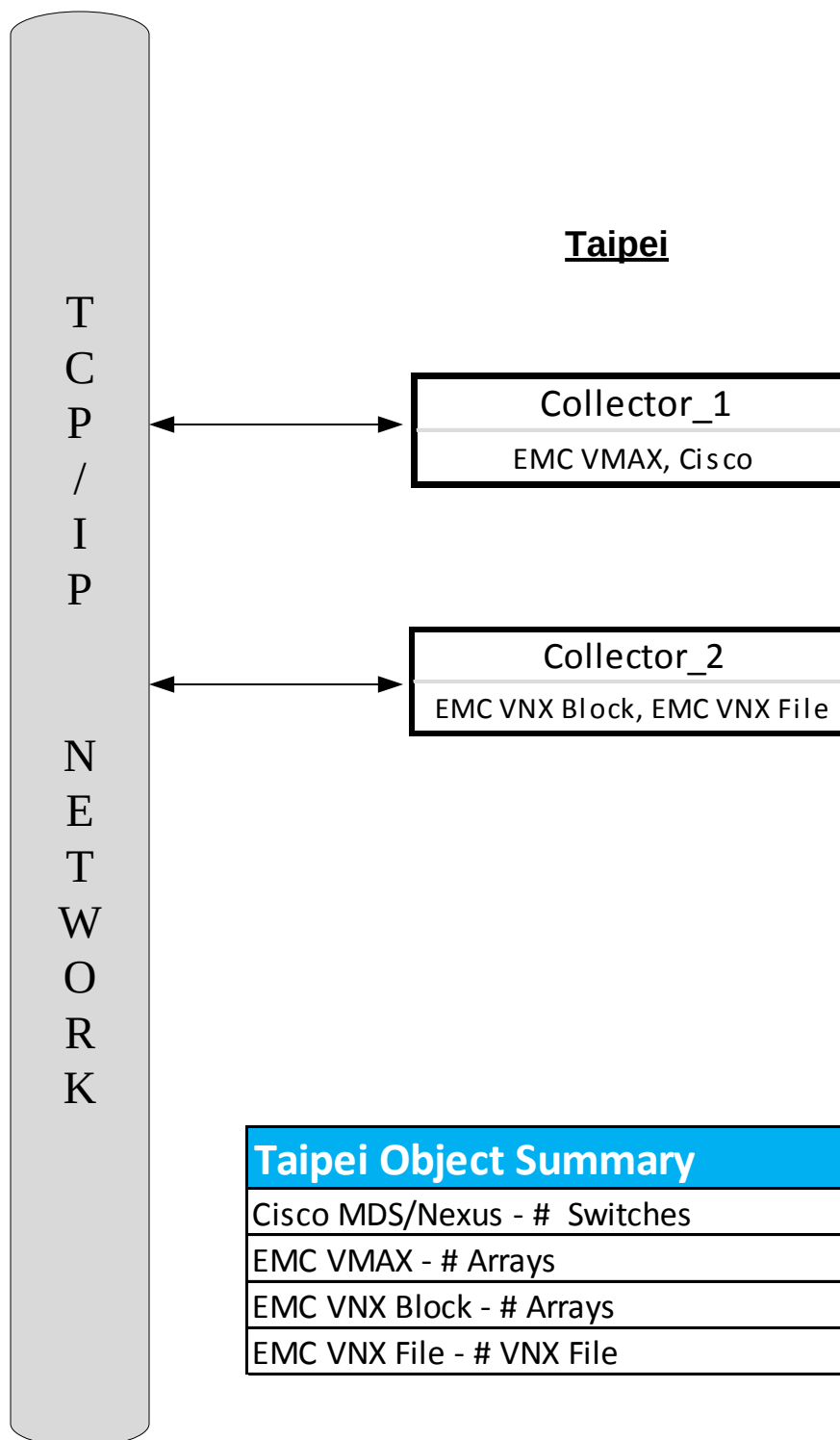


Ming Chuang



Object	Ming Chuang	Sung Zhu	Total
Cisco MDS/Nexus - # Switches	2	2	4
EMC VMAX - # Arrays	1		1

**EMC ViPR SRM 3.5.1
Design for CitiGroup
(Taipei Collectors)**



Note: All hosts will have the EMC Watch4Net Health Solution Pack.

Taipei Object Summary	Count
Cisco MDS/Nexus - # Switches	4
EMC VMAX - # Arrays	1
EMC VNX Block - # Arrays	1
EMC VNX File - # VNX File	3

SRM Sizing

Solution Pack	Count	Total Metrics	Growth Factor	Projection
EMC VMAX - # Arrays	65	41925	25	52407
EMC VMAX - # Disks	22534	247874	25	309843
EMC VMAX - # Devices	485519	10195899	25	12744874
EMC VMAX - # Pools	69	621	25	777
EMC VMAX - # Directors	2036	91620	25	114525
EMC VNX Block - # Arrays	31	18197	25	22747
EMC VNX Block - # Disks	1383	24894	25	31118
EMC VNX Block - # LUNs	2691	94185	25	117732
EMC VNX Block - # Pools	30	810	25	1013
EMC VNX File - # VNX File	73	113880	25	142350
EMC VNX File - # FileSystem	189	2646	25	3308
EMC VNX File - # DataMovers	161	7567	25	9459
EMC Centera - # Systems	10	320	25	400
EMC Centera - # Storage Pools	561	2805	25	3507
EMC Centera - # Nodes	906	5436	25	6795
VMware vCenter - # ESX hosts	51	5049	25	6312
VMware vCenter - # Virtual Machines	600	26400	25	33000
VMware vCenter - # RDMS/DataStores	568	8520	25	10650
Physical Hosts with Powerpath - # Hosts	2163	116802	25	146003
Physical Hosts with Powerpath - # FileSystems	2163	8652	25	10815
Physical Hosts with Powerpath - # Paths	2	18	25	23
Cisco MDS/Nexus - Total number of Switches	174	147726	25	184658
Cisco MDS/Nexus - # Ports and Interfaces	46286	4767458	25	5959323
Metric Totals		15929304		19911639

EMC SRM Infrastructure Requirements

(1 of 2)

VM Purpose	Number of vCPU	Memory (GB)	OS Disk Space (GB)	Application Disk Space (GB)	Total Disk Space (GB)	Contains	Location	OS
Frontend_1	4 @3.0 GHZ	16	50	70	120	Front End 1	Singapore	Linux
Frontend_2	4 @3.0 GHZ	16	50	70	120	Front End 2	Singapore	Linux
Primary Backend	4 @3.0 GHZ	24	50	724	774	Compliance, Alerting, Topology, Default DB	Singapore	Linux
Secondary Backend	4 @3.0 GHZ	24	50	1,847	1,897	Data Base & Back End: DB1, DB2, DB3, DB4	Singapore	Linux
ScaleOut Backend_1	4 @3.0 GHZ	24	50	1,847	1,897	Data Base & Back End Scaleout_1: DB5, DB6, DB7, DB8	Singapore	Linux
ScaleOut Backend_2	4 @3.0 GHZ	24	50	1,847	1,897	Data Base & Back End Scaleout_2: DB9, DB10, DB11, DB12	Singapore	Linux
ScaleOut Backend_3	4 @3.0 GHZ	24	50	1,847	1,897	Data Base & Back End Scaleout_3: DB13, DB14, DB15, DB16	Singapore	Linux
ScaleOut Backend_4	4 @3.0 GHZ	24	50	1,847	1,897	Data Base & Back End Scaleout_4: DB17, DB18, DB19, DB20	Singapore	Linux
Collector_1	4 @2.6 GHZ	24	50	150	200	EMC VMAX, EMC VNX Block, Cisco	Singapore	Linux
Collector_2	4 @2.6 GHZ	24	50	150	200	EMC VMAX, EMC VNX Block, Cisco	Singapore	Linux
Collector_3	4 @2.6 GHZ	24	50	150	200	EMC VMAX, EMC VNX File	Singapore	Linux
Collector_4	4 @2.6 GHZ	24	50	150	200	EMC VNX File, Cisco	Singapore	Linux
Collector_5	2 @2.6 GHZ	16	50	70	120	EMC_Centera	Singapore	Windows
Collector_6	2 @2.6 GHZ	16	50	70	120	EMC_Centera	Singapore	Windows
Collector_1	4 @ 2.6 GHZ	24	50	150	200	EMC VMAX, Cisco, VMware	Tsuen Wan	Linux
Collector_2	4 @ 2.6 GHZ	24	50	150	200	EMC VMAX, EMC VNX Block	Tsuen Wan	Linux
Collector_3	4 @ 2.6 GHZ	24	50	150	200	EMC VMAX, Cisco, Physical Host	Tsuen Wan	Linux
Collector_4	4 @ 2.6 GHZ	24	50	150	200	EMC VMAX, EMC VNX File	Tsuen Wan	Linux
Collector_5	2 @ 2.6 GHZ	8	50	70	120	EMC_Centera	Tsuen Wan	Windows
Collector_1	4 @2.6 GHZ	24	50	150	200	EMC VMAX, Cisco, VMware	Chai Wan	Linux
Collector_2	4 @2.6 GHZ	24	50	150	200	EMC VMAX, EMC VNX Block	Chai Wan	Linux
Collector_3	4 @2.6 GHZ	24	50	150	200	EMC VMAX, Cisco, Physical Host	Chai Wan	Linux
Collector_4	4 @2.6 GHZ	24	50	150	200	EMC VNX File, Physical Host	Chai Wan	Linux
Collector_5	2 @2.6 GHZ	16	50	70	120	EMC_Centera	Chai Wan	Windows
Collector_6	2 @2.6 GHZ	16	50	70	120	EMC_Centera	Chai Wan	Windows
Collector_1	4 @2.6 GHZ	16	50	150	200	EMC VMAX, VMware	Japan	Linux
Collector_2	4 @2.6 GHZ	16	50	150	200	EMC VNX File, Cisco, Physical Host	Japan	Linux
Collector_3	2 @2.6 GHZ	8	50	70	120	EMC_Centera	Japan	Windows

EMC SRM Infrastructure Requirements (2 of 2)

VM Purpose	Number of vCPU	Memory (GB)	OS Disk Space (GB)	Application Disk Space (GB)	Total Disk Space (GB)	Contains	Location	OS
Collector_1	4 @2.6 GHz	16	50	150	200	EMC VMAX, EMC VNX Block, Cisco	Shanghai	Linux
Collector_2	4 @2.6 GHz	16	50	150	200	EMC VMAX, EMC VNX File	Shanghai	Linux
Collector_3	2 @2.6 GHz	8	50	70	120	EMC_Centera	Shanghai	Windows
Collector_1	4@2.6 GHz	24	50	150	200	EMC VMAX, Cisco	Korea	Linux
Collector_2	4@2.6 GHz	16	50	150	200	EMC VNX File, Physical Host	Korea	Linux
Collector_3	4@2.6 GHz	16	50	150	200	EMC VNX Block, Physical Host	Korea	Linux
Collector_4	2 @2.6 GHz	8	50	70	120	EMC_Centera	Korea	Windows
Collector_1	4@2.6 GHz	16	50	150	200	EMC VMAX, EMC VNX Block	Mumbai	Linux
Collector_2	4@2.6 GHz	16	50	150	200	EMC VNX File, Cisco	Mumbai	Linux
Collector_1	4@2.6 GHz	16	50	150	200	EMC VMAX, Cisco	Mumbai (BKC)	Linux
Collector_2	2 @2.6 GHz	8	50	70	120	EMC_Centera	Mumbai (BKC)	Windows
Collector_1	4@2.6 GHz	16	50	150	200	EMC VMAX, Cisco	Sydney (Park)	Linux
Collector_2	4@2.6 GHz	16	50	150	200	EMC VNX Block, Physical Host, VMware	Sydney (Park)	Linux
Collector_1	4@2.6 GHz	16	50	150	200	EMC VMAX, Cisco	Sydney (WPH)	Linux
Collector_2	4@2.6 GHz	16	50	150	200	EMC VNX Block, Physical Host, VMware	Sydney (WPH)	Linux
Collector_1	4@2.6 GHz	16	50	150	200	EMC VMAX, EMC VNX Block, Cisco	Tamil Nadu	Linux
Collector_2	2 @2.6 GHz	8	50	70	120	EMC_Centera	Tamil Nadu	Windows
Collector_1	4@2.6 GHz	16	50	150	200	EMC VMAX, EMC VNX Block, Cisco	Kao Hsiung	Linux
Collector_1	4@2.6 GHz	16	50	150	200	EMC VMAX, Cisco	Ming Chuang	Linux
Collector_1	4@2.6 GHz	16	50	150	200	EMC VMAX, Cisco	Taipei	Linux
Collector_2	4@2.6 GHz	16	50	150	200	EMC VNX Block, EMC VNX File	Taipei	Linux

EMC SRM Network Latency Requirements

Components	Maximum Network Latency
Between Frontend and Backend	5 ms
Between Backend and Collector	300 ms
Between VMAX Collector host and Solutions Enabler or Unisphere host	20 ms ²
Between VNX Collector host and VNX provider host	20 ms (2)
Between RSA (Host) Collector and Host	20 ms (2)
Between VMware Collector and VCenter	20 ms (2)
Between SNMP collector and Brocade Switch	100 ms

² If latency between the provider and the collector is more than 20 ms, consider increasing the polling interval or decreasing the number of configuration items per collector.

SRM Firewall Ports

Source	Protocol	Ports	Direction	Target	Notes
*	TCP	58080	<--Bi-Directional -->	UI Portal Host	App access via Web
UI Portal Host	TCP	389	<--Bi-Directional -->	LDAP Host	LDAP Authentication
All Collector Hosts	TCP	2020	Out -->	Backend 1-Primary Database Host	Load Balancer
All Collector Hosts	TCP	2001	<--Bi-Directional -->	Both Backend-Database Hosts	Control Interface
All Collector Hosts	TCP	2010	Out -->	Backend 1-Primary Database Host	Alerting
VNX Collector Hosts	TCP/UDP	2040	Out -->	Backend 1-Primary Database Host	VNX Alert Consolidation
All Collector Hosts	TCP	48443	<--Bi-Directional -->	Backend 1-Primary Database Host	TMS Service
All Collector Hosts	TCP	52001	<-- In	UI Portal Host, Both Backend-Database Hosts	Event Processing
All Collector Hosts	TCP	52004	Out -->	Backend 1-Primary Database Host	Event Processing
Generic RSC Collector	TCP	5985/5986	<--Bi-Directional -->	Windows Host to be discovered	WS-MAN
Generic RSC Collector	TCP	22	<--Bi-Directional -->	UNIX Host to be discovered	ssh
Vmware Collector	TCP	443	<--Bi-Directional -->	vCenter Host to be discovered	https
Cisco Collector	UDP	161	<--Bi-Directional -->	Cisco switches to be discovered	SNMP
VNX File Collector	TCP	80/443	<--Bi-Directional -->	VNX Control Stations	http/https
VNX Block Collector	TCP	22	<--Bi-Directional -->	VNX SPA/SPB	ssh
VMAX Collector	TCP	2707	<--Bi-Directional -->	Remote SYMAPI Servers	Remote SYMAPI Calls
Centera Collector	TCP	3218/3682/7069/8069	<--Bi-Directional -->	Centera Nodes	SDK/Centera API Calls
NetApp Collector	TCP	22	<--Bi-Directional -->	NetApp Node	ssh
HDS Collector	TCP	5988/5989	<--Bi-Directional -->	HDS Array Host	SMI-S
HDS Collector	TCP	1099/51099/2000/2001/51100	<--Bi-Directional -->	HDS Array Host	Text Collector
IBM XIV Collector	TCP	5988/5989	<--Bi-Directional -->	IBM CIM Agent Host	IBM CIM

EMC Storage Prerequisites

EMC VMAX SolutionPack							
Support List:	DMX-3, DMX-4, DMX-4 950, VMAX, VMAX SE series						
Requirements:	Solutions Enabler 7.6.2.8 or higher						
	Unisphere for VMAX 1.6.2 or higher (Unisphere for VMAX must be setup to collect performance data)						
	SMI-S Provider 4.6.2 for LUN Performance Metrics						
	Symmetrix communications occur via GateKeepers. The two options available are outlined below)						
	(Remote Mode - Option 1) - Assign 2 additional gatekeepers to existing SYMAPI server.						
	SRM will utilize the existing SYMAPI Server to communicate with the Symmetrix Devices via SYMCLI.						
	No additional software will need to be installed on the SYMAPI server.						
	In the event that the SYMAPI Server uses a "nethost" file, ensure the collector hostname or IP Address						
	is in it. For example, "vm-2981-564 *"						
	(Local Mode - Option 2) - Assign 2 additional gatekeepers to existing SYMAPI server.						
	Install the VMAX Collector on the SYMAPI server. A unique server can also be used if desired.						
	If using ACL's - SRM will run the SYMCLI commands under a user called "apg".						
	The "apg" user requires permissions to access the storapid daemon in the daemon_users file.						
Info Needed:	Array Serial Number, IP Address for Unisphere for VMAX Server, Unisphere Credentials, SYMCLI Credentials if using ACL's						
EMC VNX SolutionPack							
Support List:	Flare Code 4.30; 5.31 or higher						
	Used with CLARiiON, VNX1 and VNX2 Models						
	VNXe OE 3.0 (Block and File)						
	Used with second generation VNXe modules as of VNXe3200						
	First generation VNXe models such as VNXe3100, VNXe3150 and VNXe3300 are not supported.						
	DART 5.6 and 6.0; VNX OE for File 7.0 or later						
	Used with Celerra, VNX1 and VNX2 models						
Requirements:	Naviseccli (The version should match the Flare code level.)						
	Performance Statistics need to be enabled on SPA & SPB						
	User Account (service account) with read only privileges (Block & File Accounts)						
Info Needed:	Array Serial Numbers, IP Addresses SPA, SPB, Control Station(s), Credentials						
EMC Centera SolutionPack							
Support List:							
Requirements:	Collector must be installed on Windows 2008, 2008R2						
	Centera 4.3 must be installed on collector server						
	User Account (Service Account) with monitor role privileges						
Info Needed:	Hostname or IP Address of Management Node, Credentials						
EMC XtremIO SolutionPack							
Support List:	XtremIO 2.4 and later						
Info Needed:	Unique friendly name for XIO array						
	Management IP Address or hostname						
	Username (Read-only account) and Password						

Third Party Storage Prerequisites

IBM XIV SolutionPack							
Support List:	IBM XIV						
Requirements:	The XIV CIM Agent must be available (In v10.1.0 and higher, it is preinstalled & enabled on the admin module)						
	User Account (Service Account).						
Info Needed:	(3) Management IP Addresses, Credentials						
Hitachi SolutionPack							
Support List:	AMS200, AMS2100, USP and USP-V, HUS and VSP						
Requirements:	Hitachi Command Suite 7.4.1 or higher (Full license; core license is not adequate.)						
	CIM/WBEM features must be enabled in Hitachi Device Manager						
	User Account with admin privileges on the Hitachi Device Manager system						
Info Needed:	Array name or IP Address for the Hitachi Device Manager, Credentials						
NetApp Filer SolutionPack							
Support List:	NetApp Filer 7-Mode on Ontap v7 or higher						
	NetApp Filer Cluster-Mode on Ontap v8 or higher						
	Note: The cluster management IP must be provided during C-Mode Filer discovery						
Requirements:	SRM utilizes NetApp CLI via SSH to communicate to NetApp arrays. SSH v2 must be enabled						
	SSH connection to the NetApp devices with the following role : login-ssh, cli-stats*, cli-snap*, cli-aggr*						
	cli-vol*, cli-disk*, cli-environment, cli-nfs*, cli-cifs* , cli-df, cli-sysconfig, cli-ifconfig, cli-version						
	C-Mode requires admin privilege for user to run commands of type 'run -node *' and 'statistics samples delete W4N*'						
	A full list of the CLI Commands can be provided as needed for proper user account access creation						
	Polling must be done to the real NetApp Filer (not a vFiler)						
Info Needed:	NetApp filer Mode, Hostname, IP Address, Credentials						

Cisco FC Switch Prerequisites

Cisco MDS/Nexus Switch SolutionPack						
Support List:	Cisco MDS (9xxx)					
	Cisco ONS (1520x)					
	Cisco Nexus (5548, 1000V)					
Requirements:	Supported MIBS:					
	CISCO-FLASH-MIB					
	CISCO-NS-MIB					
	CISCO-DM-MIB					
	CISCO-ENTITY-SENSOR-MIB					
	ENTITY-MIB					
	CISCO-FC-FE-MIB					
	IF-MIB					
	CISCO-ENTITY-FRU-CONTROL-MIB					
	CISCO-VSAN-MIB					
	CISCO-ZS-MIB					
	CISCO-SYSTEM-EXT-MIB					
	SNMPv2-MIB					
	CISCO-FCS-MIB					
	CISCO-FEATURE-CONTROL-MIB					
	SNMP must be enabled/configured. SRM Supports v1 ,v2C and v3 (SHA auth & AES128 privacy only)					

Host Prerequisites

VMware vCenter SolutionPack						
Support List:	VMware vCenter Server 4.1 or higher					
	Vmware ESX 4.1, 5.0, 5.1					
Requirements:	vCenter User Account - Read Only Account with Browse Datastore and all Storage View privileges					
	If PowerPath / VE is running and metrics are desired, PP /VE 5.8 or later is required					
Info Needed:	vCenter Hostname or IP Address, Credentials					
EMC Physical Hosts						
Support List:	HPUX 11iv1 11.11, HPUX11iv2 11.23, HPUXiv3 11.31					
	IBM AIX 5.1, 5.2, 5.3, 6.1, 7.1					
	Linux RHEL AS/ES 4.x, 5.x, 6.x					
	Linux SUSE es9, ES9.3, ES10, ES11					
	Solaris 9, 10, 11, SVM, VxVM, zfs					
	Microsoft Windows 2003, 2003 R2 SP2, 2003 SP2					
	Microsoft Windows 2008 Core, 2008 SP1, 2008 SP2, 2008 R2					
	Microsoft Windows 2012					
	Standard, Enterprise and Datacenter editions					
Requirements:	Host Prerequisites: (PowerPath is only needed if PowerPath metrics are desired)					
	HPUX - PowerPath 5.2, INQ 7.6.1 or higher, perl interpreter 5.6.1 or higher					
	IBM AIX - PowerPath 5.7b194, INQ 7.6.1 or higher, perl interpreter 5.6.1 or higher					
	RHEL & SUSE Linux - PowerPath 5.7, INQ 7.6.1.0 or higher, perl interpreter 5.6.1 or higher					
	Solaris - PowerPath 5.5 P02 HF02, INQ 7.6.1.0 or higher, perl interpreter 5.6.1 or higher					
	Windows - PowerPath 5.7, Powershell 2.0, INQ 7.6.1.0 (Optional)					
	Linux / Unix host connections will utilize SSH. A user account with sudo access is required					
	Sudo user needs root privileges to run the following commands: inq, powermt, sar, mpstat, vgdisplay					
	vxdisk (Solaris)					
	dmidecode, vgs, lvdisplay (Linux)					
	Windows hosts connections will utilize WinRM & PowerShell. PowerShell 2.0 or higher is required					
	WinRM Execution Policy should be set to unrestricted :set-executionpolicy unrestricted					
Info Needed:	HostName or IP Address, OS Version, Credentials					

Application Prerequisites

Oracle Database SolutionPack								
Support List:	Oracle 10 & up							
Requirements:	Oracle Config Type (Simple, RAC)							
	The appropriate JDBC driver (based on the Oracle version to be discovered) jar file needs to be installed.							
	Hostname or IP address of Database Server and the Database Service Name							
	Oracle database user credentials are required. Either an administrator equivalent system account or a dedicated system account.							
	SP requires the Oracle JDBC driver matching your Oracle DB version available on the APG collector							
Info Needed:	Oracle Config Type, Hostname or IP Address of DB Server, DB Service Name, Credentials							