

Recurring Capital Investment Plan
for RUNet “Evergreening”
Rutgers, The State University of New Jersey



Prepared by Adrienne Gerald and Michael Scarpellino for the Telecommunications Division
Enterprise Systems and Services
Office of Information Technology
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Executive Summary

Rutgers University is a highly connected campus employing a network designed for high performance, reliability and resiliency. Faculty, staff and students currently enjoy the benefits of this robust, reliable network – RUNet (Rutgers University Network). RUNet is architected to support data, voice and video applications.

Networking technology typically has a lifespan of five years. In general, the pace of technological innovation has accelerated and subsequently, new applications are being developed regularly that require more bandwidth and sometimes, new features. Equipment manufacturers such as Cisco, Juniper and others adhere to a finite timeframe that they will support this equipment relative to repair, replacement, software upgrades and patches, etc. This allows the manufacturers to maintain a stream of new products and the ability to service and support them accordingly.

RUNet is regularly assessed and consequently, equipment is identified for replacement when it either no longer supports requirements at the university, or is no longer supported by the manufacturer/vendor. It is especially important to track this since the university has almost 2000 switches and routers that are directly affected by manufacturer / vendor “end of life” or “end of sale” designations.

The majority of RUNet is Cisco equipment. A typical Cisco product cycles through several milestones as it moves out of the marketplace. The first milestone is the End of Life (EoL) announcement, which alerts the marketplace that Cisco will begin phasing out a given product or platform. The EoL bulletin lays out the timeline, which includes End of Sale, End of Engineering and End of Support milestones. These milestones differ between product lines, but generally follow a schedule such that the End of Support falls five years to the day after the End of Sale date.

The Request - \$3Million Annually

An annually recurring capital investment of \$3Million will allow the university to retire and replace the oldest equipment, eliminate near term exposure and extend the risk timeline. More importantly, it will allow us to make smart decisions about the next generation of RUNet without the complication of just maintaining RUNet as a viable utility.

A capital investment plan that will refresh the technology employed in RUNet and reduce our exposure to operational deficiencies is required. Hesitation to embark on a capital investment plan will necessitate a much larger capital outlay and unduly stress our technical resources with a much larger undertaking.

RUNet must evolve and remain apace with technological growth in order to continue providing service that users within the university are accustomed, and also to provide the basis for delivering newer services in the future.

The equipment has been divided into two (2) worksheets that identify the status of the RUNet inventory for devices managed by the Telecommunications Division (TD):

Device type, function, description, quantity, End of Sale/End of Support information, and Estimated Replacement Costs are contained within [Worksheet 1. Risk – Current to 2 years](#) and [Worksheet 2. Risk – From 2 to 5 years or more](#)

Why this is Important

Many of the major networking elements now comprising RUNet have reached critical points in the vendor's EoL cycle. Most elements have reached End of Sale, and may no longer be purchased new through normal distribution channels. Some elements are nearing the end of the EoL cycle, and are at risk of no longer being eligible for maintenance coverage.

RUNet is a critical utility at the university and fundamental to the success of research, teaching, and learning. The goal of TD as part of the Office of Information Technology is to continue providing seamless, pervasive and exceptional services for the university community. RUNet is an enabler for the university community.

The majority of devices comprising RUNet were purchased between mid-1999 and early 2003. The devices purchased during this time were consistent with industry standards and practices, and represented the most practical advanced technology available. The pace of technology improvement has quickened, hence many devices are obsolete or close to obsolescence.

RUNet (Rutgers University Network) – A Technical Description

The campus network, known as RUNet, consists of an OC48 (2.4GB) SRP ring, interconnecting trees of high-speed routers throughout the New Brunswick-Piscataway metropolitan area. The Camden campus network connects to the RUNet core via two distinct 150MB Ethernet Private Line connections. The Newark campus network connects to the RUNet core via two distinct OC3 Private Line (155MB) connections. The networks on all three metropolitan campuses are designed for transparent support of data, voice and video traffic.

External connectivity is available from the campus network through the Rutgers Regional Network (RRN). RRN provides connections to the Internet through Sprint via an OC12 (~622Mbps) and Verizon through a fractional OC3 (35Mbps); to Internet2 through MAGPI via a fractional OC12 (~150MB); to other directly-connected research institutions such as Seton Hall, Stevens Institute of Technology, UMDNJ and St. Joseph's Hospital; and to other institutions of research and higher education throughout New Jersey via the NJEdge Consortium network (~45Mbps). These connections are diversified across the RRN infrastructure, with consideration to robustness and reliability.

Some Notes and Assumptions

All pricing is estimated, as several single devices require multiple device replacement. Final estimates reflect our current hardware discount of 40.2%. This discount is valid with our vendor ePlus through January 31, 2009 (RFP#364).

Costs do not reflect fiber, racks, Gbics, cabling, electric, etc. Costs also do not reflect equipment not owned and operated by TD (i.e., departmental equipment).

Architectural changes to RUNet are not considered as part of this request.

Worksheet 1. Risk – Current to 2 years

Device	Function	Description	Qty	End of Sale	End of Support	Estimated Replacement Cost	Notes
Cisco 1900	Access	End-user ports	43	7/27/2002	7/27/2007	\$0.00	Replacement funds from ICI; replaced with recycled WS-C2948G
Cisco 4700 router	Access	Legacy Router Access	1	7/10/1998	7/10/2003	\$11,500.00	Replace with 4500-L3 at est'd \$11,500 per unit
Cisco Catalyst 2900-XL Series	Access	End-user ports	1	5/30/2000	5/30/2005	\$10,000.00	Replace with 4503 at \$10,000 per unit
Cisco Catalyst 3548-XL	Access	End-user devices	1	5/30/2000	5/30/2005	\$7,500.00	Replace with 4506 prorated to \$7500 per unit
Cisco Catalyst 3524-XL	Access	End-user devices	29	5/30/2000	5/30/2005	\$108,750.00	Replace with 4506 prorated to \$7500 per unit
Cisco C6K-SUP1/MSFC	Access	1st Gen. Supervisor for Catalyst 6000/6500	4	7/3/2000	7/3/2005	\$88,000.00	Upgrade to SupervisorII @\$22,000 per unit
Cisco 4500 router	Access	Legacy Router Access	1	11/24/2000	11/25/2005	\$11,500.00	Upgrade testing underway. Layer3 switching @\$11,500 per unit; 1 in transition; 2 retired
Cisco 2500 router	Access	Legacy Router Access	4	4/30/2002	5/1/2007	\$28,000.00	Upgrade to 2800 series router @\$7,000
Cisco Catalyst 6000 chasis	Access	2nd Gen.Chasis for 6000 series Sup	4	5/15/2002	5/15/2007	\$35,980.00	Upgrade to 6500E chasis @\$8995 per unit
Cisco Catalyst 3500-XL-EN	Access	End-user ports	112	6/27/2002	6/27/2007	\$840,000.00	Replace with 4506 prorated to \$7500 per unit
Cisco Catalyst 3508G-XL-EN	Access	Access Layer Aggregation	16	6/27/2002	6/27/2007	\$0.00	Eliminated in new access model
Cisco Catalyst 5500	Access	1st Gen. Access Router	4	6/30/2003	6/30/2008	\$46,000.00	Replace with 4500-L3 at est'd \$11,500 per unit
Cisco Catalyst 5500	Access	1st Gen. Access Router + Access blades	29	6/30/2003	6/30/2008	\$675,000.00	Replace with standard access layer infrastructure @ ~ \$150/port *** 29 ResNet devices for est'd 4500 ports
			249			\$1,862,230.00	TOTAL ESTIMATED REPLACEMENT COST
						\$1,113,613.54	TOTAL ESTIMATED REPLACEMENT COST w/ 40.2%
							<i>*NOTE: ALL Pricing (with exception of RESNET 5500 replacement) does NOT include required peripherals, aggregation, distribution, GBICS, power, racking, fiber and cabling equipment</i>
End of Sale:	<i>Last date product can be purchased new from standard channels</i>						
End of Support:	<i>Last date that Cisco will accept maintenance calls and issue replacement parts for product</i>						
***Analysis assumes no changes in overall architecture.							

Worksheet 2. Risk – From 2 to 5 years or more

Device	Function	Description	Qty	End of Sale	End of Support	Estimated Replacement Cost	Notes
Cisco 7200	Access	Legacy Router Access	18	2/3/2004	2/3/2009	\$207,000.00	Upgrade testing underway. Layer3 switching @\$11,500 per unit; 6 in transition; 1 retires
Cisco Catalyst 2900-XL-EN	Access	End-user ports	50	4/9/2004	4/9/2009	\$125,000.00	Replace (2) two XL-EN's with one 2948G-GE-TX at \$5,000 per unit list
Cisco 7505/7507	Access	Legacy Router Access	14	6/30/2004	6/30/2009	\$161,000.00	Replace with 4500-L3 at est'd \$11,500 per unit
Cisco 7513	Access	Legacy Router Access	2	12/15/2007	12/15/2012	\$23,000.00	Replace with 4500-L3 at est'd \$11,500 per unit
Cisco Catalyst 2948G	Access	End-user ports	584	11/3/2004	11/3/2009	\$4,380,000.00	Replace with 4506 prorated to @\$7500 per unit
Cisco Catalyst 2948G-GE-TX	Access	End-user ports	309	1/30/2007	1/29/2012	\$2,317,500.00	Replace with 4506 prorated to @\$7500 per unit
Cisco Catalyst 2980G	Access	End-user ports	282	11/3/2004	11/3/2009	\$3,525,000.00	Replace with 4506 prorated to @\$12,500 per unit
Cisco Catalyst 4912G	Access	Aggregation within Access layer	122	11/3/2004	11/3/2009	\$0.00	Eliminated in new access model
Cisco Catalyst 4912G	Core - Switched	Backup Ring	5	11/3/2004	11/3/2009	\$40,000.00	Replace with 3750-12-S @\$8,000 per unit
Cisco Catalyst 4912G	Distribution	Connects access routers to core routers	31	11/3/2004	11/3/2009	\$248,000.00	Replace with 3750-12-S @ \$8,000 per unit list
Cisco C6K-SUP1A-MSFC2	Access	2nd Gen. Supervisor for Catalyst 6000/6500	4	3/25/2005	3/25/2010	\$107,200.00	Upgrade to Supervisor II @\$22,000 per unit
Cisco C6K-SUP2-MSFC2	Access	3rd Gen. Supervisor for Catalyst 6000/6500	22	N/A	N/A	\$105,600.00	Current Standard; 512MB memory upgrades @\$4,800 per unit
Cisco 3750	Access	Aggregation within Access/Distribution layer	23	N/A	N/A	N/A	Current Standard
Cisco 4506	Access	Legacy Router Access	13	N/A	N/A	N/A	Current Standard
Cisco 7200VXR	Access	Legacy Router Access	4	N/A	N/A	\$30,000.00	Requires processor upgrades @\$7,500 per unit
Cisco Catalyst 6500 chasis	Access	3rd Gen. Chasis for 6000 series Sup	64	N/A	N/A	N/A	Current Standard
Cisco GSR12008	Core - Routed	Primary Core network	N/A	N/A	N/A	N/A	Cisco GSR 12000 Upgrades - components
Cisco GSR12008 - GRP	Route processor	1st generation Gigabit Route Processor mod	20	37073	38899	400000	Replace with PRP-1 processor @\$20,000 per unit; cost offsets GSR8/40 upgrades
Cisco GSR12008 - GRP-B	Route processor	2nd generation Gigabit Route Processor mod	8	38077	39903	160000	Replace with PRP-1 processor @\$20,000 per unit; cost offsets GSR8/40 upgrades
Cisco GSR12008 - GE-GBIC-SC	Interface Mod/GE	Cisco 12000 series 3 port GE line card	28	38442	40268	2100000	Replace with 4GE-SFP-LC @ \$75,000 per unit
Cisco GSR12008 - LC-1OC48/DPT	Interface Mod/SRP	Cisco 12008 OC48 SRP line card	28	39319	41146	3780000	Replace with SPA-2XOC48POS/RPR with SIP-500 carrier at \$135,000 each
Cisco GSR12008 - GSR8/40	Chassis	Cisco 12008 chassis/40Gbps backplane	14	38411	40237	1610000	Replace with GSR12410 router @\$95,000 per unit; unit cost offset by GRP/GRP-B upgrades
			1645			\$19,319,300.00	TOTAL ESTIMATED REPLACEMENT COST
						\$11,552,941.40	TOTAL ESTIMATED REPLACEMENT COST w/ 40.2%
							<i>*NOTE: ALL Pricing does NOT include required peripherals, aggregation, distribution, GBICS, power, racking, fiber and cabling equipment</i>
End of Sale:	<i>Last date product can be purchased new from standard channels</i>						
End of Support:	<i>Last date that Cisco will accept maintenance calls and issue replacement parts for product</i>						
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