

City of Milwaukee, Department of Public Works

Replacement Phone System, Total Cost of Ownership (TCO) Study

Consensus for four acquisition scenarios to be researched during this study are detailed as follows:

- City purchases new system outright from vendor and maintains the system itself (PBX)
 - Need the actual price for purchasing system from vendor
 - Need to determine the cost to city for obtaining the money for purchase (bond issue?)
 - Opportunity value of the money. (What else could the City do with the same funds?)
 - Need to factor in City employee costs to maintain system
 - Need to factor in estimated replacement parts cost
 - Residual value after five (5) years is 28%

- City leases the new system from vendor and maintains the system itself (PBX)
 - Need to see terms of lease provided by vendor
 - Fair market value buy out at end of term
 - 10% buyout at end of term
 - \$1 buy out at end of term
 - Need the actual monthly lease price from vendor
 - Need to factor in City employee cost
 - Need to factor in estimated replacement parts cost
 - Lease payments will continue in years six (6) through ten (10), based on residual value

- City leases the new system from vendor and has the vendor maintain the system (PBX)
 - Need monthly amounts of both lease and maintenance costs
 - Need to determine % increase from vendor per year for the system life

- City leases the system from vendor and has vendor maintain the system (CENTREX)
 - Need to try to determine “apples to apples” feature comparison
 - Need to configure similar CENTREX product
 - Need to determine the “fit” of CENTREX into the City infrastructure and cabling environment
 - Need to determine monthly costs for service
 - Need to determine % increase from vendor for life of system

Current Environment:

Number of technicians supporting the main switch and remote nodes?

Ten, of which six are trained on the switch administration, and support it on a 24-hour on-call basis.

Other functions that the technicians perform?

Switch administration, Moves, add & Changes (MAC), data and network wiring, jack installations, PA system installations, fiber optic wiring, security wiring. Maintenance, testing, and troubleshooting on all items.

Percentage of time devoted to moves, adds, and changes (MAC) on switch?

Average loaded cost of these technicians? (Salary plus benefits).

\$44.00 per hour

Average % loaded cost increase over the life of the switch?

5% annual increase

Other duties that are foreseen for the technicians to do?

More data activities, along with more troubleshooting.

Average number of MAC for the past 5 years?

1000 – 1200 per year.

Average number of switch repair orders over the past 5 years?

Every day a technician spends 2 – 3 hours work on switch administration/maintenance.

Average cost of those repair orders, including parts and labor over the past 5 years.

\$1000 for each call. At least 30 – 40 calls annually.

From where were parts sourced?

Manufacturer?

Originally through Rolm distributor (Norstan).

Secondary market?

Secondary market opportunities for purchase still exist but are dwindling due to the age and manufacture discontinuance of the parts. City has been getting parts from Rolm users that have removed their systems. City still has contact with the Rolm User's Group for part acquisition (mass purchase of another clients hardware).

Mass purchase of another client's hardware?

Systems have been purchase from Wisconsin Gas Co. and Towne Realty in the past several years to use as replacement parts.

Inventory of parts in stock now?

The City has a plentiful supply of parts now, but that could change if the 9th module is added as planned in the fall of this year.

Where will you source parts from in the future?

Contacts through the Rolm User's Group.

What is the manufacture's support of the current environment?

The manufacturer stopped supporting this version of switch some time ago, but the local vendor, Norstan, has a contract with the City in case of a disastrous occurrence, that the City's switch will be operational within 24 hours of notification.

What is the City's disaster plan if the main module goes out?

Nothing in writing, but with the Norstan contract previously mentioned and the fact that the City has six trained switch technicians, they feel secure in their ability to react.

Real estate issues:

What is the footprint of the main module?

Approximately 12 cabinets in an environmentally controlled, raised floor room, about 20' X 30'. A second room, adjacent to the switch room stores the batteries used for uninterruptible power.

Remote module?

Have yet to visit remote sites.

What are the equipment room specifications of the main module?

See above. The equipment room has a Liebert air conditioning unit and raised flooring system.

Remote modules?

Have yet to visit remote sites.

What is the cost of maintaining the environment in the equipment rooms?

\$20,000 annually for all equipment rooms, for air conditioning, plus scheduled maintenance.

Future Environment:

What features does the City foresee "absolutely needing" for features?

- Redundant processors and power supplies
- Battery backup
- Call summary recording
- Route optimization / Least cost routing
- Forced authorization codes
- Data switching
- Trunk queueing
- Call name display
- ACD & Reporting capability
- Music on hold for all locations
- Locator ID building & room information for 911 calling
- Caller ID to telephone
- ISDN Primary direct connect to switch port
- Remote peripheral shelf
- Digit translation
- Ten-digit conversion
- Ten-digit restriction
- Complete maintenance training for six (6) technicians
- Moves, Adds, and Changes (MAC) training for eight (8) additional people
- Training for all end users
- Voice mail

What are the "nice to have" features?

- ISDN Basic to the desktop

Desktop units should be as follows:

- 668 Model 6416 display stations w/ built in speakerphone

- 1672 Model 6408 display stations with built in speakerphone

- 1460 single line telephone sets with displays

Also need to account for all remote locations. The City's desire is to have every location on the network using the same types of instruments. This would mean the change out of the TIE & Panasonic key systems that exist in the City. See attached spreadsheet of City locations to be included in this study, the types of systems they are currently using and the approximate number of telephones at each location. Set approximations were determined by Terry Brehmer of the City Department of Public Works.

What will the footprint of the main module be?

For the purpose of this study we are using an Avaya PBX. The footprint of the proposed system would be four (4) cabinets instead of the sixteen (16) that exist today.

Remote modules?

A single shelf will be installed at eighteen (18) sites

What will be the equipment room specifications of the main module?

Room size will be cut in half, from 20x20' to 20x10'

Remote modules?

Same space as using today

What is the anticipated cost of maintaining the environment in the equipment rooms?

There is an estimated savings of \$43,200 per year

Will the old and new systems be able to co-habitate while the new system is installed?

Yes. There will be no disruption of service at any of the locations

What will the training costs associated with the new system per technician be?

Will check with Avaya for the purposes of this study.

Where will the training take place?

Same as above.

How long will each technician be away from the job while training?

Same as above.

How will the City backfill in the absence of technicians out for training?

Probably only allow two technicians to be gone for training at any one time unless the training is in a greater Milwaukee metro location.

**City of Milwaukee Telephone Systems Study Purchase / City Maintain Option
Scenario 1 - (15 Year)**

	2002	2003	2004	2005	2006
Total Costs					
Switch Purchase Price	\$ 4,961,800.00				
Installation Costs	Included				
Total One-time Charges	\$ 4,961,800.00				
Annual Charge Back	\$ 1,096,101.36	\$ 1,096,101.36	\$ 1,096,101.36	\$ 1,096,101.36	\$ 1,096,101.36
Annual Environmental Costs (Savings) *	\$ (43,200.00)	\$ (43,200.00)	\$ (44,496.00)	\$ (45,830.88)	\$ (47,205.81)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)
Spare Maintenance Parts Costs	\$ 100,000.00				
Vendor Maintenance Costs (RMATS)	\$ 105,600.00	\$ 105,600.00	\$ 105,600.00	\$ 105,600.00	\$ 105,600.00
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)
City Employee Costs *	\$ 48,400.00	\$ 50,820.00	\$ 53,361.00	\$ 56,029.05	\$ 58,803.50
Annual Costs	\$ 1,144,501.36	\$ 1,222,321.36	\$ 1,123,566.36	\$ 1,124,899.53	\$ 1,126,299.05

* Costs Provided by City of Milwaukee

** 1100 hours is part of the time technicians spend on the City switch. Other hours are spent on moves, add, and changes, (MACs), and Fire/Police maintenance.

**City of Milwaukee Telephone Systems Study Purchase / City Maintain Option
Scenario 1 - (15 Year)**

	2007	2008	2009	2010	2011	2012	2013
Switch Purchase Price							
Installation Costs							
Total One-time Charges							
Annual Charge Back							
Annual Environmental Costs (Savings) *	\$ (48,621.98)	\$ (50,080.64)	\$ (51,583.06)	\$ (53,130.55)	\$ (54,724.47)	\$ (56,366.20)	\$ (58,057.19)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)
Spare Maintenance Parts Costs							
Vendor Maintenance Costs (RMATS)	\$ 116,160.00	\$ 116,160.00	\$ 116,160.00	\$ 116,160.00	\$ 127,776.00	\$ 127,776.00	\$ 127,776.00
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)
City Employee Costs *	\$ 61,743.67	\$ 64,930.86	\$ 68,072.41	\$ 71,476.02	\$ 75,049.82	\$ 78,802.31	\$ 82,742.43
Annual Costs	\$ 42,281.69	\$ 44,010.22	\$ 45,649.35	\$ 47,505.47	\$ 61,101.35	\$ 63,212.11	\$ 65,461.24

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**City of Milwaukee Telephone Systems Study Purchase / City Maintain Option
Scenario 1 - (15 Year)**

	2014	2015	2016	15 Year Total
Switch Purchase Price				
Installation Costs				
Total One-time Charges				
Annual Charge Back				\$ 5,480,506.80
Annual Environmental Costs (Savings) *	\$ (59,798.90)	\$ (61,592.87)	\$ (63,440.66)	\$ (738,129.20)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (112,000.00)
Spare Maintenance Parts Costs				\$ 100,000.00
Vendor Maintenance Costs (RMATS)	\$ 127,776.00	\$ 140,553.60	\$ 140,553.60	\$ 1,679,251.20
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (1,106,000.00)
City Employee Costs *	\$ 86,879.55	\$ 91,223.53	\$ 95,784.71	\$ 1,044,118.86
Annual Costs	\$ 67,856.65	\$ 83,184.26	\$ 85,897.65	\$ 6,347,747.66

* Costs Provided by City of Milwaukee

** 1100 hours is part of the time technicians spend on the City switch. Other hours are spent on moves, add, and changes, (MACs), and Fire/Police maintenance.

**City of Milwaukee Telephone System Study Lease PBX / City Maintain Option
Scenario 2 (15 Year)**

	2002	2003	2004	2005	2006
Switch Purchase Price	\$ 4,961,800.00				
Installation Costs	Included				
Total One-time Charges	\$ 4,961,800.00				
Annual Lease Costs (True lease option)	\$ 595,200.00	\$ 1,190,400.00	\$ 1,190,400.00	\$ 1,190,400.00	\$ 1,190,400.00
Annual Environmental Costs (Savings) *	\$	(43,200.00)	(44,496.00)	(45,830.88)	(47,205.81)
Annual Power Back-Up Costs (Savings)*	\$	(8,000.00)	(8,000.00)	(8,000.00)	(8,000.00)
Spare Maintenance Parts Costs	\$	100,000.00			
Vendor Maintenance Costs (RMATS)	\$	105,600.00	105,600.00	105,600.00	105,600.00
Elimination of Existing Maintenance Contract*	\$	(79,000.00)	(79,000.00)	(79,000.00)	(79,000.00)
City Employee Costs *	\$	48,400.00	50,820.00	53,361.00	56,029.05
Annual Costs	\$ 643,600.00		\$ 1,217,865.00	\$ 1,219,198.17	\$ 1,220,597.69

1100 hours/yr **

*Costs Provided by City of Milwaukee

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**City of Milwaukee Telephone System Study Lease PBX / City Maintain Option
Scenario 2 (15 Year)**

	2007	2008	2009	2010	2011	2012	2013
Switch Purchase Price							
Installation Costs							
Total One-time Charges							
Annual Lease Costs (True lease option)	\$ 476,332.80	\$ 476,332.80	\$ 476,332.80	\$ 476,332.80	\$ 476,332.80	\$ 476,332.80	\$ 476,332.80
Annual Environmental Costs (Savings) *	\$ (48,621.98)	\$ (50,080.64)	\$ (51,583.06)	\$ (53,130.55)	\$ (54,724.47)	\$ (56,366.20)	\$ (58,057.19)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)
Spare Maintenance Parts Costs							
Vendor Maintenance Costs (RMATS)	\$ 116,160.00	\$ 116,160.00	\$ 116,160.00	\$ 116,160.00	\$ 127,776.00	\$ 127,776.00	\$ 127,776.00
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)
City Employee Costs *	\$ 61,743.67	\$ 64,930.86	\$ 68,072.41	\$ 71,476.02	\$ 75,049.82	\$ 78,802.31	\$ 82,742.43
Annual Costs	\$ 518,614.49	\$ 520,343.02	\$ 521,982.15	\$ 523,838.27	\$ 537,434.15	\$ 63,212.11	\$ 65,461.24

*Costs Provided by City of Milwaukee

** 1100 hours is part of the time technicians spend on the City switch. Other hours are spent on moves, add, and changes, (MACs), and Fire/Police maintenance.

**City of Milwaukee Telephone System Study Lease PBX / City Maintain Option
Scenario 2 (15 Year)**

	2014	2015	2016	15 Year Total
Switch Purchase Price				
Installation Costs				
Total One-time Charges				
Annual Lease Costs (True lease option)				\$ 7,738,464.00
Annual Environmental Costs (Savings) *	\$ (59,798.90)	\$ (61,592.87)	\$ (63,440.66)	\$ (738,129.20)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (112,000.00)
Spare Maintenance Parts Costs				\$ 100,000.00
Vendor Maintenance Costs (RMATS)	\$ 127,776.00	\$ 140,553.60	\$ 140,553.60	\$ 1,679,251.20
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (1,106,000.00)
City Employee Costs *	\$ 86,879.55	\$ 91,223.53	\$ 95,784.71	\$ 1,044,118.86
Annual Costs	\$ 67,856.65	\$ 83,184.26	\$ 85,897.65	\$ 8,605,704.86

*Costs Provided by City of Milwaukee

** 1100 hours is part of the time technicians spend on the City switch. Other hours are spent on moves, add, and changes, (MACs), and Fire/Police maintenance.

**City of Milwaukee Telephone System Study Lease PBX / Vendor Maintain Option
Scenario 3 (15 Year)**

	2002	2003	2004	2005	2006
Switch Purchase Price	\$ 4,961,800.00				
Installation Costs	Included				
Total One-time Charges	\$ 4,961,800.00				
Annual Lease Costs (True lease option)	\$ 595,200.00	\$ 1,190,400.00	\$ 1,190,400.00	\$ 1,190,400.00	\$ 1,190,400.00
Annual Environmental Costs (Savings) *	\$	(43,200.00)	(44,496.00)	(45,830.88)	(47,205.81)
Annual Power Back-Up Costs (Savings)*	\$	(8,000.00)	(8,000.00)	(8,000.00)	(8,000.00)
Spare Maintenance Parts Costs	N/A	N/A	N/A	N/A	N/A
Vendor Maintenance Costs (Full)	\$	311,252.40	311,252.40	311,252.40	311,252.40
Elimination of Existing Maintenance Contract*	\$	(79,000.00)	(79,000.00)	(79,000.00)	(79,000.00)
City Employee Costs *	N/A	N/A	N/A	N/A	N/A
Annual Costs	\$ 595,200.00	\$ 1,371,452.40	\$ 1,370,156.40	\$ 1,368,821.52	\$ 1,367,446.59

* Costs Provided by City of Milwaukee

**City of Milwaukee Telephone System Study Lease PBX / Vendor Maintain Option
Scenario 3 (15 Year)**

	2007	2008	2009	2010	2011	2012	2013
Switch Purchase Price							
Installation Costs							
Total One-time Charges							
Annual Lease Costs (True lease option)	\$ 476,332.80	\$ 476,332.80	\$ 476,332.80	\$ 476,332.80	\$ 476,332.80		
Annual Environmental Costs (Savings) *	\$ (48,621.98)	\$ (50,080.64)	\$ (51,583.06)	\$ (53,130.55)	\$ (54,724.47)	\$ (56,366.20)	\$ (58,057.19)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)
Spare Maintenance Parts Costs	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vendor Maintenance Costs (Full)	\$ 342,377.64	\$ 342,377.64	\$ 342,377.64	\$ 342,377.64	\$ 376,615.40	\$ 376,615.40	\$ 376,615.40
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)
City Employee Costs *	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Annual Costs	\$ 683,088.46	\$ 681,629.80	\$ 680,127.38	\$ 678,579.89	\$ 711,223.73	\$ 233,249.20	\$ 231,558.21

* Costs Provided by City of Milwaukee

**City of Milwaukee Telephone System Study Lease PBX / Vendor Maintain Option
Scenario 3 (15 Year)**

	2014	2015	2016	15 Year Total
Switch Purchase Price				
Installation Costs				
Total One-time Charges				
Annual Lease Costs (True lease option)				\$ 7,738,464.00
Annual Environmental Costs (Savings) *	\$ (59,798.90)	\$ (61,592.87)	\$ (63,440.66)	\$ (738,129.20)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (112,000.00)
Spare Maintenance Parts Costs	N/A	N/A	N/A	N/A
Vendor Maintenance Costs (Full)	\$ 376,615.40	\$ 414,276.94	\$ 414,276.94	\$ 4,949,535.64
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (1,106,000.00)
City Employee Costs *	N/A	N/A	N/A	N/A
Annual Costs	\$ 229,816.50	\$ 265,684.07	\$ 263,836.28	\$ 10,731,870.44

* Costs Provided by City of Milwaukee

**City of Milwaukee Telephone System Study Centrex Option
Scenario 4 (15 Year)**

	2002	2003	2004	2005	2006
Switch Purchase Price	N/A	N/A	N/A	N/A	N/A
Installation Costs *	\$ 1,316,000.00	N/A	N/A	N/A	N/A
Total One-time Charges	\$ 1,316,000.00	N/A	N/A	N/A	N/A
Annual Lease Costs *	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00
Annual Environmental Costs (Savings)*		\$ (48,000.00)	\$ (49,440.00)	\$ (50,923.20)	\$ (52,450.90)
Annual Power Back-Up Costs (Savings)*		\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)
Spare Maintenance Parts Costs	N/A	N/A	N/A	N/A	N/A
Vendor Maintenance Costs		\$ 165,000.00	\$ 173,250.00	\$ 181,912.50	\$ 191,008.13
Elimination of Existing Maintenance Contract*		\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)
City Employee Costs	N/A	N/A	N/A	N/A	N/A
Annual Costs	\$ 2,630,000.00	\$ 1,344,000.00	\$ 1,350,810.00	\$ 1,357,989.30	\$ 1,365,557.23

* Costs Provided by City of Milwaukee

**City of Milwaukee Telephone System Study Centrex Option
Scenario 4 (15 Year)**

	2007	2008	2009	2010	2011	2012
Switch Purchase Price	N/A	N/A	N/A	N/A	N/A	N/A
Installation Costs *	N/A	N/A	N/A	N/A	N/A	N/A
Total One-time Charges	N/A	N/A	N/A	N/A	N/A	N/A
Annual Lease Costs *	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00
Annual Environmental Costs (Savings)*	\$ (54,024.42)	\$ (55,645.16)	\$ (57,314.51)	\$ (59,033.95)	\$ (60,804.96)	\$ (62,629.11)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)
Spare Maintenance Parts Costs	N/A	N/A	N/A	N/A	N/A	N/A
Vendor Maintenance Costs	\$ 200,558.53	\$ 210,586.46	\$ 221,115.78	\$ 232,171.57	\$ 243,780.15	\$ 255,969.16
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)
City Employee Costs	N/A	N/A	N/A	N/A	N/A	N/A
Annual Costs	\$ 1,373,534.11	\$ 1,381,941.30	\$ 1,390,801.27	\$ 1,400,137.62	\$ 1,409,975.18	\$ 1,420,340.04

* Costs Provided by City of Milwaukee

**City of Milwaukee Telephone System Study Centrex Option
Scenario 4 (15 Year)**

	2013	2014	2015	2016	15 Year Total
Switch Purchase Price	N/A	N/A	N/A	N/A	N/A
Installation Costs *	N/A	N/A	N/A	N/A	\$ 1,316,000.00
Total One-time Charges	N/A	N/A	N/A	N/A	\$ 1,316,000.00
Annual Lease Costs *	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00	\$ 1,314,000.00	\$ 19,710,000.00
Annual Environmental Costs (Savings)*	\$ (64,507.99)	\$ (66,443.23)	\$ (68,436.52)	\$ (70,489.62)	\$ (820,143.56)
Annual Power Back-Up Costs (Savings)*	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (8,000.00)	\$ (112,000.00)
Spare Maintenance Parts Costs	N/A	N/A	N/A	N/A	N/A
Vendor Maintenance Costs	\$ 268,767.61	\$ 282,205.99	\$ 296,316.29	\$ 311,132.11	\$ 3,233,774.28
Elimination of Existing Maintenance Contract*	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (79,000.00)	\$ (1,106,000.00)
City Employee Costs	N/A	N/A	N/A	N/A	N/A
Annual Costs	\$ 1,431,259.63	\$ 1,442,762.77	\$ 1,454,879.77	\$ 1,467,642.49	\$ 22,221,630.72

* Costs Provided by City of Milwaukee