



Integrated Process Solutions, Inc.

Fosston, MN • Waunakee, WI



Integration, Professionally

49th Annual Conference

Wisconsin Wastewater Operator's Association

Can you Hear Me Now?

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Agenda

- Telemetry Basics
- Original Project Overview
- Original Project Costs
- Revised Project Overview
- Revised Project Costs
- Cost Comparison and Payback Analysis
- System Operation and Performance

Telemetry Basics

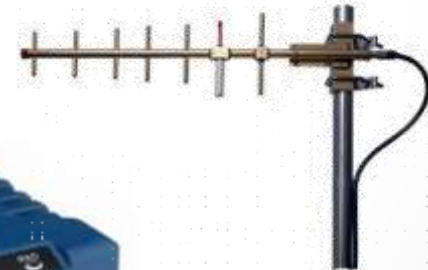
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Numerous Telemetry Options Available

- Telephone
 - Pay for service
 - Dial-up

- Dedicated radio
 - Privately owned
 - Licensed
 - Unlicensed

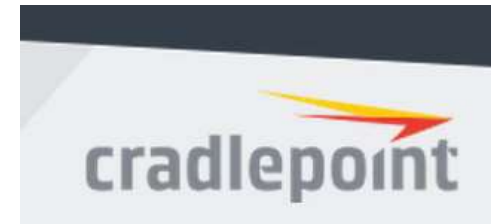


Numerous Telemetry Options Available

- High speed
 - Pay for service
 - Cable
 - DSL
 - Fiber optic



- Cellular
 - Pay for service
 - Proprietary RTU or cellular modem
 - Private network



- Satellite
 - Pay for service
 - Proprietary RTU



Need to Weigh Pros and Cons for Each Option

	Telephone	Dedicated Radio	High Speed	Cellular	Satellite
Capitol cost	None	High	Low	Low	Low
Annual cost	Low	None	High	Medium	Medium
Speed	Low	Med-High	High	Med-High	Low
Availability	High	High	High	High	High
Reliability	High	High	High	Med-High	High
Security	High	Low-Med	Low	Low	Medium

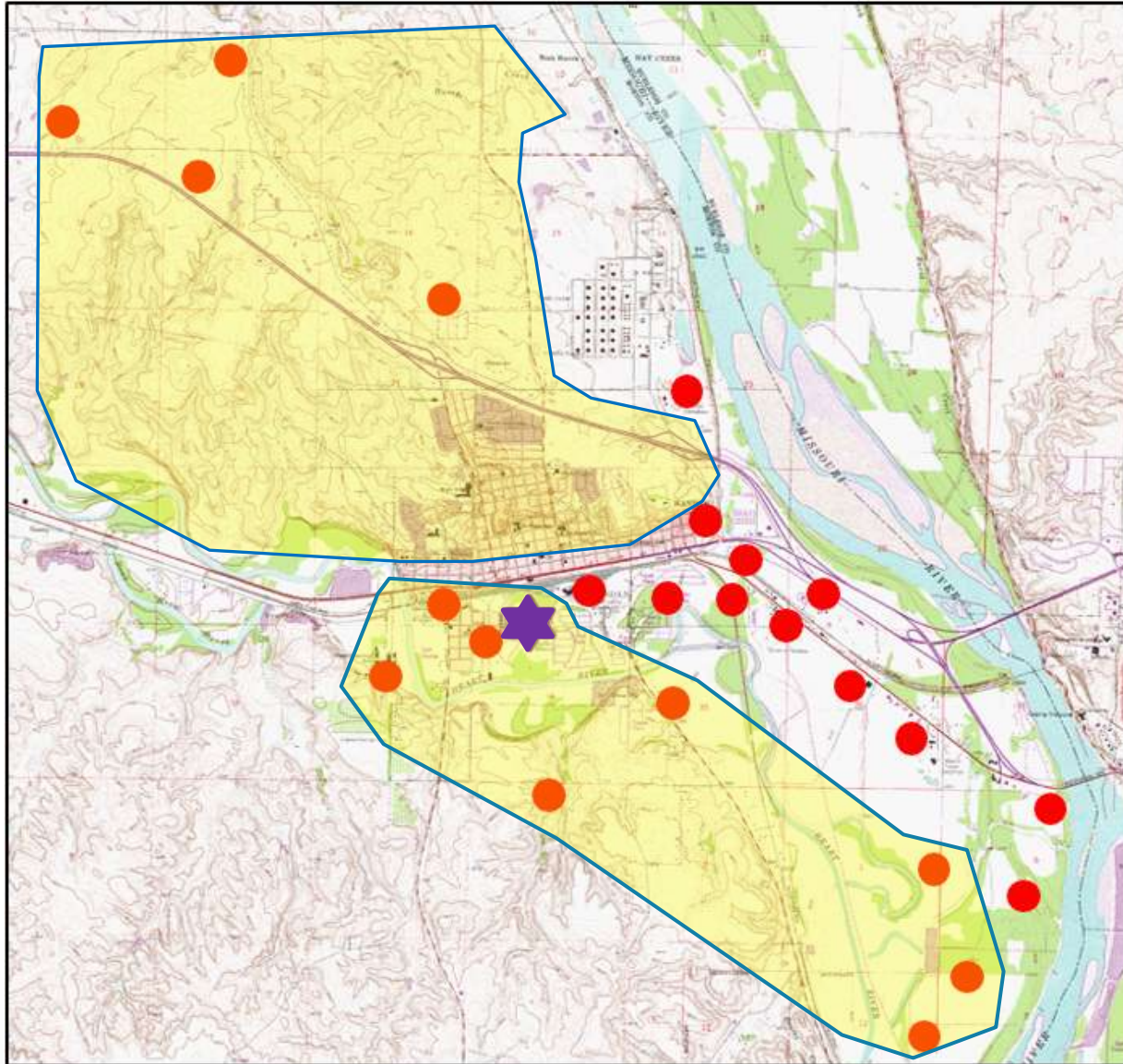
Original Project Overview and Costs

Original Project Overview

- Original scope
 - 24 sewage lift stations
 - Fixed Ethernet radio system
 - Urban and rural locations
 - Central monitoring location
 - HMI software

SITE DESCRIPTION	LATITUDE	LONGITUDE
19TH ST.	46°48'26.09"N	100°53'14.39"W
40TH AVE.	46°47'58.42"N	100°50'17.08"W
FOOTBALL	46°49'5.81"N	100°54'1.16"W
HIGHLAND ROAD	46°52'5.81"N	100°55'53.30"W
HWY 1806	46°48'46.35"N	100°52'27.40"W
KINSELLA	46°49'24.58"N	100°53'3.78"W
KIST LIVESTOCK	46°48'43.47"N	100°50'19.32"W
LAKEWOOD DR.	46°47'10.12"N	100°50'4.90"W
MARINA BAY	46°47'34.34"N	100°49'46.06"W
MASTER	46°49'25.35"N	100°52'27.02"W
McKENZIE DR.	46°48'3.91"N	100°49'29.58"W
MIDWAY LANES	46°48'59.89"N	100°50'51.14"W
OFFICE	46°49'11.48"N	100°53'54.45"W
OLD RED TRAIL	46°51'52.19"N	100°57'15.98"W
PIRATES LOOP	46°48'25.04"N	100°49'23.40"W
PORSBORG	46°51'32.76"N	100°56'2.90"W
RIVER BEND	46°50'30.55"N	100°52'9.65"W
RIVERWOOD DR	46°49'24.45"N	100°51'55.71"W
STATE INDUSTRIAL SCHOOL (SIS)	46°48'58.02"N	100°54'48.16"W
SPEEDWAY	46°49'17.23"N	100°51'24.59"W
TERRA VALLEE	46°51'7.09"N	100°54'6.31"W
TWIN CITY DR.	46°49'41.82"N	100°51'53.84"W
VIADUCT	46°49'27.66"N	100°54'7.96"W
WEEDAS	46°49'47.16"N	100°52'4.37"W
WHEY TO GO	46°49'26.39"N	100°51'9.37"W

Challenging Topography



- Mountainous
 - Half of sites in “hilly” areas
 - Antenna towers at each site
 - 16-foot
 - 25-foot
 - 40-foot
 - 60-foot
 - 150-foot

Original Project Costs

- Control panel costs.....\$305,000
 - Radio and hardware
 - PLC upgrades
- Tower and antenna costs.....\$263,000
 - Concrete base
 - Tower
 - Radio hardware and equipment
 - Tools and equipment for installation
- HMI software.....\$50,000
- General construction.....\$79,000
 - Bonds, insurance, mobilization, travel, expenses

Total Project Cost: \$697,000



Revised Project Overview and Costs

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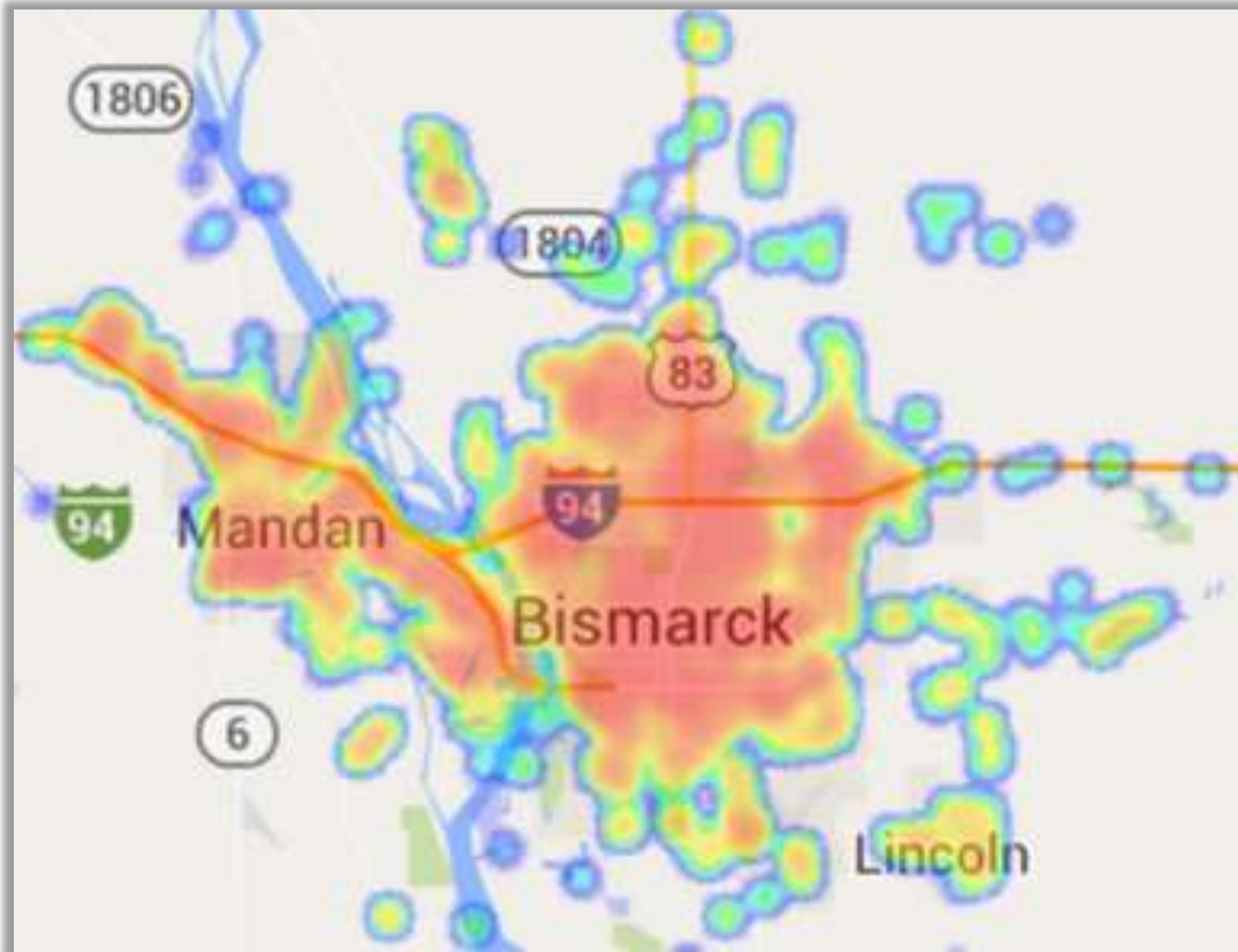


Revised Project Overview

- Revised scope
 - 24 sewage lift stations
 - **Verizon cellular network**
 - Urban and rural locations
 - Central monitoring location
 - HMI software

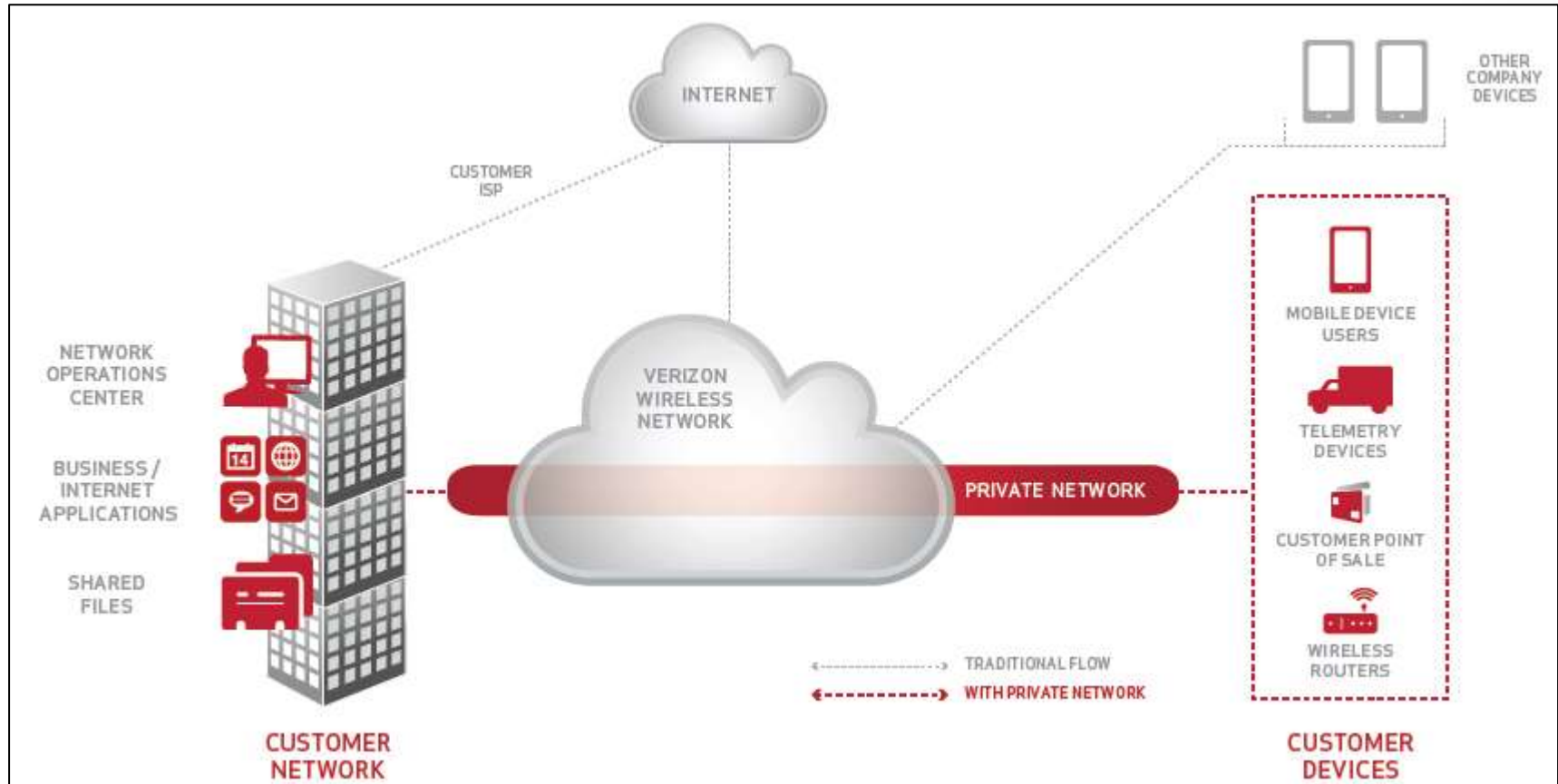
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Cellular Infrastructure Utilized to Reduce Project Costs



Verizon Cellular Coverage Map

Verizon Wireless Network Used as Communication Backbone (Machine-to-Machine Network)



HMI PC's

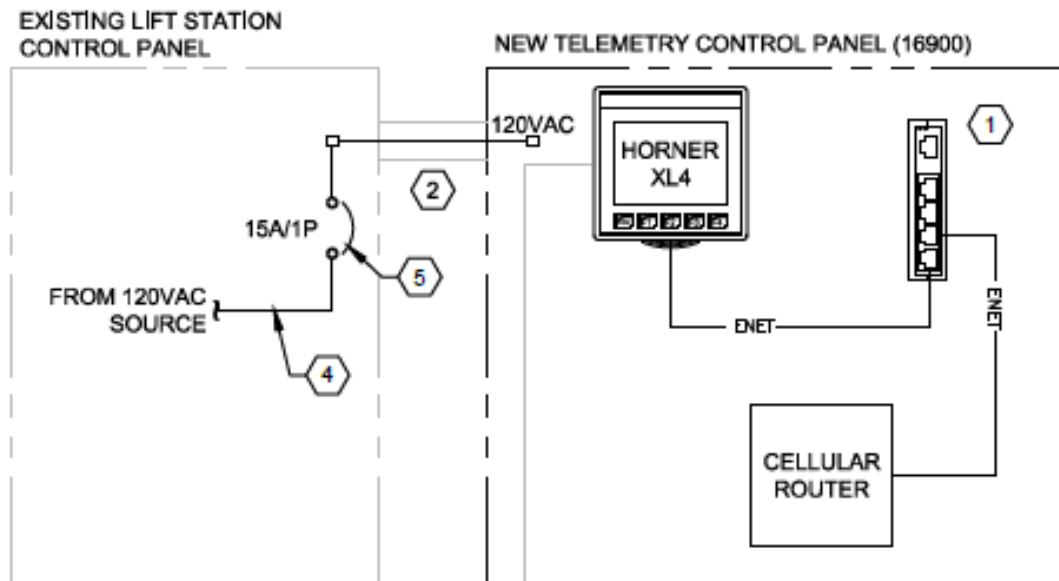
Lift Station Panels

Preliminary Testing Determined Data Plan and Costs

Machine-to-Machine Data Plans				
Groups	Monthly Access	MB Allowance	Share Option	Overage
Group 1	\$5	1 MB	Included	\$1/MB
	\$7	5 MB		
	\$10	25 MB		
	\$15	50 MB		
	\$18	150 MB		Remote sites
Group 2	\$20	250 MB	Included	\$.015/MB
	\$25	1 GB		
	\$50	5 GB		
	\$80	10 GB		

Control Panel Components and Infrastructure Simplified

- Original design
 - Radio (1-3 per site)
 - Antenna tower
 - Tower base, installation, and electrical work
 - Tools and equipment for installation
- Revised design
 - Cellular modem (one per site)



Revised Project Costs

- Control panel costs.....\$170,000
 - Cellular equipment
 - PLC upgrades
- HMI software.....\$50,000
- General construction.....\$27,000
 - Bonds, insurance, mobilization, travel, expenses

**Total Revised Project Cost:
\$247,000**



Cost Comparison – Original versus Revised

	Original	Revised
Control Panel Costs	\$305,000	\$170,000
Tower and Antenna Costs	\$263,000	\$0
HMI Software and Computer	\$50,000	\$50,000
General Construction	\$79,000	\$27,000
Total Project Cost	\$697,000	\$247,000

Capitol Cost Difference:
\$450,000

Cost Comparison – Including Cellular Service Cost

	Original	Revised
Total Project Cost	\$697,000	\$247,000

- Remote sites
 - 24 sites, \$18/month plus fees and taxes
 - Use \$25/month
 - **\$7,200 per year**
- Master site
 - 1 site, \$80/month plus fees and taxes
 - Use \$90/month
 - **\$1,080 per year**
- Life-cycle cost, 15-year analysis
 - Simple math
 - Annual service cost increase of 3%
 - Modem replacement at Years 5 and 10 for cellular technology
 - Life-cycle cost = \$204,000
 - **Net project savings of \$246,000**

Net Savings: \$246,000

System Operation and Performance

- System Operation and Performance
 - Fully on-line and completed in February of 2015
 - Performance and cost data not yet available
 - Good network speed/performance
 - Network setup and maintenance has been difficult
 - Large cellular companies can be non-responsive
 - Significant effort to setup network and coordinate with provider
 - Intermittent data issues
 - Subject to system/network maintenance
 - Can happen without notice or warning

Summary

- Many options are available for telemetry/communication
- Cellular technology is becoming more widespread
- Need to weigh cost, benefits, pros, and cons of different technologies specific to your system
- Up-front testing and research is important with pay-for-service systems

Questions

