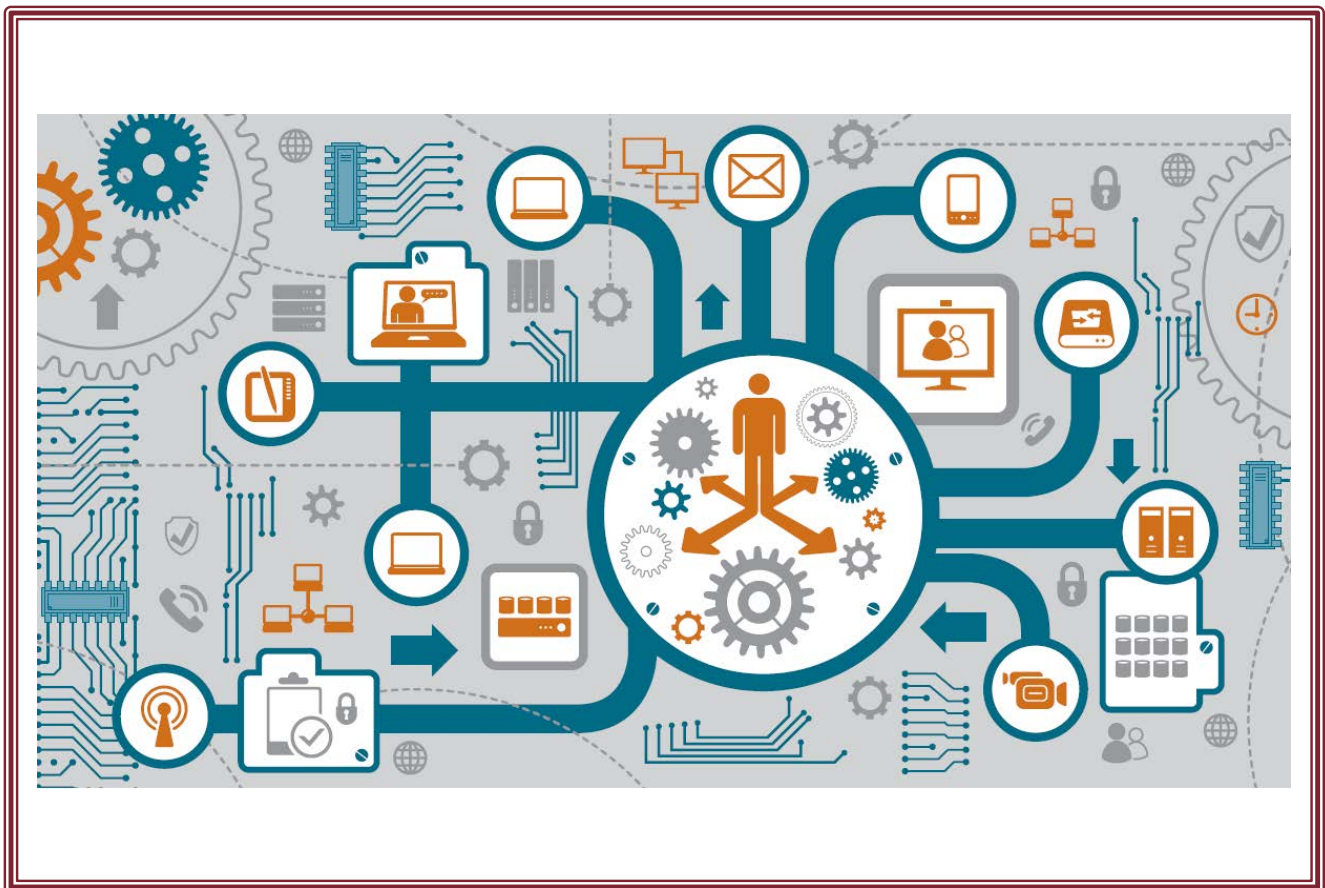# City of Pittsburgh Office of Management & Budget

Request for Information for Smart Streetlights, RFI No. 2017-0001

April 3, 2017

Electronic Copy

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April 3, 2017

City of Pittsburgh
Office of Management and Budget
City-County Building, Room 502
Pittsburgh, PA 15219

RE: Request for Information for Smart Streetlights, RFI No. 20170001

Dear Mr. Simpson,

The City of Pittsburgh Office of Management and Budget is seeking entities interested in forming partnerships with the City to develop, operate, and/or fund next-generation Smart City projects while providing a more efficient and equitable lighting system. As a leading provider of technology solutions to government entities, CDW Government LLC (CDW•G) is perfectly positioned to assist the City in the planning and implementation of your Smart Streetlights project.

CDW•G understands the scope of this Request for Information and is ready to assist the City throughout your search for the ideal technology solution. Please see the enclosed proposal for a response to all areas of the RFI, a description of possible solutions for the City and links to supporting documentation. A few of the key benefits of working with CDW•G include:

- **Experienced Account Team.** CDW•G has extensive experience assisting government agencies as they work to improve their IT systems and provide the best value using the resources available. Your dedicated CDW•G account team is ready to provide information and support for the City as you move to create a "Smart City."
- **Highly trained Architects, Engineers, and IT resources.** CDW•G has invested in a team of Business Architects, with deep industry and IOT/Digital Transformation experience, to help our valued clients create and execute a Smart City strategy.
- **Strong partnerships.** CDW•G is a Gold Certified partner with Cisco—a leader in smart technologies; in turn, Cisco is a Diamond-level partner with CDW•G, allowing us to offer unparalleled levels of support and expertise in implementing your solution.

CDW•G is pleased to be able to assist the City in your progressive new technology endeavors. The following pages outline some of the exciting ideas that CDW•G has formulated for the City. For further details or assistance please reach out to CDW•G Account Manager, Ben Benigno. Ben can be reached by phone at 203.851.7083, or by email at benbeni@cdwg.com. Thank you for the opportunity, we look forward to building our relationship with the City.

Sincerely,

Jennifer Fabianski
Manager, Proposal Teams

Proposal

Project Overview

Requirement

Describe the solution you are proposing and its objectives. Provide designs that help us understand how it would work with the existing streetlight poles and other infrastructure on our streets. Detail the scale, scope and stage of your idea. Has it been deployed elsewhere? If so include detailed materials describing that deployment. If not, provide as much technical details as you can. If the idea is in beta or more nascent, please indicate this; ideas at all stages are of interest to the City.

Response

CDW•G partners with several certified vendors to build out complete smart city solutions. Some of the solutions we can provide are through partners such as Cisco, Piper, Splunk, IBM, and Azeti. The solutions available to the City of Pittsburgh are listed below.

Lighting Control and Energy Optimization:

CDW•G partners closely with Cisco and suggests implementing their Smart+Connected City Lighting solution. By leveraging current infrastructure and replacing previous street lights we are able to provide a smarter LED solution. This solution will allow LED's to dim while maintaining the quality of life provided by standard street lights. We are able to make them smart based on motion and ambient light, which offers an additional 10-20% in savings. The centralized administration is able to have a live view of all lights and alerts on status, asset management, remote management, smart dimming and scene setting. This also integrates into other solutions such as city wifi, video surveillance, smart parking, and many other sensor options (Humidity, temperature, CO2/02, UVA/UVB, Motion, sound, video, etc.) Ultimately, cities are able to instantly recognize savings of 40-50% in electricity. For additional details see the following link:

http://www.cisco.com/web/strategy/smart_connected_communities/city-lighting.html

Public Safety and Security:

Through our partners, CDW•G can offer several solutions that can enhance overall City safety. Our major partners in this space are Panasonic, Hitachi, Cisco, and IPVision. Our solutions can be integrated onto street infrastructure such as lights, parking garages,

campuses, stadiums and wearable technologies. For example, the Cisco Smart+Connected Safety and Security solution includes video, sound, and motion-capture capabilities that enable security services management on city streets, in parking lots and garages, and across college and corporate campuses where there is a need for enhanced security, asset protection, and perimeter detection. These edge-based, real-time analytics might include configurable events and alerts that can trigger lighting conditions and other actions, cost-effective extension of the security perimeter, license plate or facial recognition and gunshot detection & location. Beyond capturing intelligence information from the edge devices, we offer solutions to store and analyze data to make real-time decisions for public safety personnel. Please see the following link for further information about this Cisco solution:

http://www.cisco.com/web/strategy/government/safe_secure.html

Smart Parking:

By continuing to leverage Pittsburgh's connected infrastructure, CDW•G would be able to provide a smart parking solution that could be deployed to streets, parking lots, or parking garages. By using sensors and cameras we can identify and track open and occupied parking spots. We can direct drivers toward available spaces on the streets or in garages. Integration into current or new City mobile apps also allows drivers and passengers to use their mobile devices to find where there is parking.

Identifying open spaces can assist in controlling the flow of traffic and alleviating congestion. When drivers are able to find parking faster this will lead to increased visitation and increased spending. Please see the link below for details on this parking initiative:

http://www.cisco.com/web/strategy/smart_connected_communities/city_parking.html

Location Analytics:

By starting with simple traffic counting and tracking CDW•G can provide data and analysis on city congestion. Once this has been implemented, CDW•G can then provide the tools and capabilities to adjust traffic patterns that can lead to controlled emissions, reduction of heavy traffic and how to better serve the population of Philadelphia. Using a Cisco based infrastructure we can integrate into products like IBM or Splunk to provide in-depth analysis of traffic, both vehicle and pedestrian based. Please see the following links for information on Cisco location analytics solutions:

http://www.cisco.com/c/en/us/solutions/industries/smart-connected-communities/city-traffic.html

Smart Transportation:

Traffic planners have long used historical data to create signal plans that optimize "green time" to improve traffic flow. By connecting traffic signals, any light can be adjusted within a very short period of time to adapt to real-time traffic issues identified from close circuit cameras. Instead of using people to monitor traffic, radar sensors and cameras, along with sophisticated algorithms, can adjust lights automatically. A system of this type allows for the ability to manipulate traffic signals in the path of an emergency vehicle, halting conflicting traffic and allowing the emergency vehicle the right-of-way. By deploying new infrastructure, as well as connecting into legacy systems, we are able to connect buses, trains and accurately provide arrival times and alert passengers of current status. This would also allow OIC to provide alerts on hazards, amber alerts, weather, traffic and any other emergency updates. By enabling Vehicle-to-Vehicle and Vehicle-to-infrastructure communications we are able to provide real-time updates to central command stations. Please see the following link for details on this smart transportation solution:

http://www.cisco.com/c/en/us/solutions/industries/transportation/connected-mass-transit.html

CDW•G's partner, Cisco, has deployed Smart City solutions in cities across the country and around the world. Please see the following links for additional information about a few of these projects:

- Kansas City, KS: https://www.cisco.com/c/dam/en/us/solutions/collateral/case-studies-customer-success-stories/kansas-city-customer-success-summary.pdf
- Schenectady, NY: https://www.youtube.com/watch?v=57HBbB6oAng
- Barcelona, Spain: http://www.cisco.com/assets/global/ES/docs/2014-07-cisco-case-study-barcelona-connected-city_en.pdf

Deployment Plan

Requirement

Please let us know how specifically this project will deploy across Pittsburgh's infrastructure. Would you recommend a pilot deployment before undertaking the full project? If so, describe the scale of the pilot and parts of the city you feel would make the best testbed for your idea, and why.

Response

CDW•G partners with numerous organizations, such as Cisco, that would allow us to leverage their areas of expertise. To that effect, Cisco has dozens of ecosystem partners they have worked with previously to complete other Smart City solutions. Additionally, CDW•G can identify other appropriate partners or work closely with any partner organizations that Pittsburgh may be considering.

All of our recommended vendors go through an integration validation process for sensors, applications, and their interaction with Cisco's network and platform. We define their

functionalities and provide guidance on how each device would fit best per Pittsburgh's need, topology, and regional specification. CDW•G will work with Pittsburgh to provide the best, most flexible solution possible.

Furthermore, Cisco would like to include a pilot of the technologies outlined in this response. The goal of the pilot would be to provide a solution that will: provide energy consumption savings, enhance citizen safety, and demonstrate how the Cisco CDP platform along with Smart Lighting provides a great value to Pittsburgh. Pilot options start with 10 street lights, but can be expanded to include a "Golden Mile" option that will allow us to use Smart Lighting as a core service, but also provide additional components such as crowd monitoring, and safety and security.

Technical Specifications

Requirement

Provide as much technical detail for the project as you can, including its power, sensor and communications technologies. Any solution will be selected based on a technical evaluation of not just its Smart City aspects but also its traditional technical aspects, such as the color temperature, photometrics and other details of the LED luminaires. (Note that should we proceed through an RFP process, all devices will be tested in the real world.) Describe your plans for data ownership, transmission, security, and privacy. Open standards and industry best-practices will be applied in considering ideas.
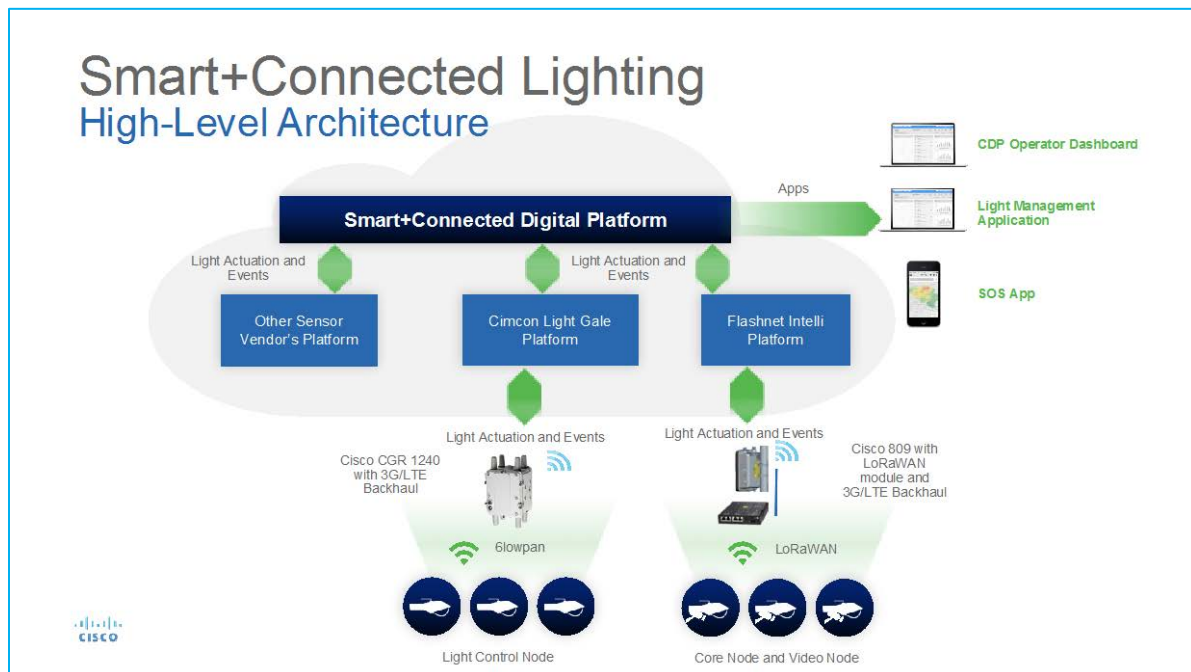
Response

Figure 1. High-Level Architecture

CIMCON Lighting/Cisco Network

Street lights outfitted with intelligent wireless controls provide a unique opportunity to make cities "smart" through the inclusion of a wide variety of sensors that act as the "eyes and ears" of the city. Leveraging the Internet of Things (IoT), CIMCON Lighting, Inc. is the leader in intelligent street light control systems by enabling cities to become "smart" by bringing together intelligence, controls, wireless connectivity, and smart sensors to their street and roadway lighting infrastructures. CIMCON 's wireless control systems provide the ideal "on-ramp" for connecting a city's street lights and making them "smart" by creating a "multi-services" platform for driving energy efficiency, sustainability, and a reduction in operating and maintenance costs.

Designed for LED, Solar, and HID-based lamps, CIMCON Lighting uses the latest RF-Wireless technology to connect 7-pin ANSI compliant controllers to a robust, web-based Central Management System (CMS) via a wireless gateway, thus allowing cities to quickly and easily manage all of their street and roadway lighting assets via one easy-to-use platform. In addition to "adaptive dimming" and robust scheduling capabilities, CIMCON 's controllers enable the addition of numerous other sensors, including but not limited to: tilt, traffic, motion, and occupancy.

Key features of CIMCON 's intelligent street light control system:

- Remote control and scheduling
- GPS integration for easy asset management
- Flexible dimming controls
- Revenue grade energy metering
- Asset management and health monitoring
- Fault tolerant
- Alert Notifications via email and SMS text messages
- Burn hours monitoring and reporting
- 128/256 bit AES encryption between all devices for optimal security.

Key benefits:

- Reduce energy costs by at least 30 percent through adaptive dimming
- Reduce maintenance and repair costs by up to 50 percent with "one trip" repairs"
- Reduce light pollution
- Increase lamp life
- Plug and Play installation
- Exceptional fault tolerance
- Increase quality of lighting services.

Operational Considerations

<u>Requirement</u>

Provide detailed information about the useful life of the component technologies included in your proposed project, along with specific information about how and where any of its technologies have been field tested. The City will need to fully understand the additional investment required to maintain technology over the life of the project, as well as the proposed maintenance model. Will the City or partner vendors maintain components in the field? What failure rate would be expected and what costs incurred by the City for replacement components?

<u>**Response**</u>

Sensors and Edge Network Capabilities

Third-party sensors and devices are endpoints of the platform that would be mounted on street infrastructures, access switches in street cabinets, city-wide network routers, and Radio-Frequency Identification (RFID) or Wi-Fi tags. Determining which sensor to use involves trade-offs, taking into account the nature of the data, physical limitations, weather conditions, and cost versus accuracy.

Lifetime maintenance is important because installation and replacement costs in outdoor environments can be high. Our vendors offer sensors that are integrated with the Digital Platform. Sensors on the ground with different capabilities can be combined, for a customized solution that suits Pittsburgh's needs.

A myriad of sensors connect securely through the IoT gateway. Many support edge-based computing to increase real-time response time and reduce cloud-required network bandwidth, facilitating events at the edge of the network. Third-party sensors also provide functionalities that vary depending on the provider.

Cisco's architecture supports a fog architecture to optimize performance and distribute real-time computing to the edge of the infrastructure, using event-based processing.
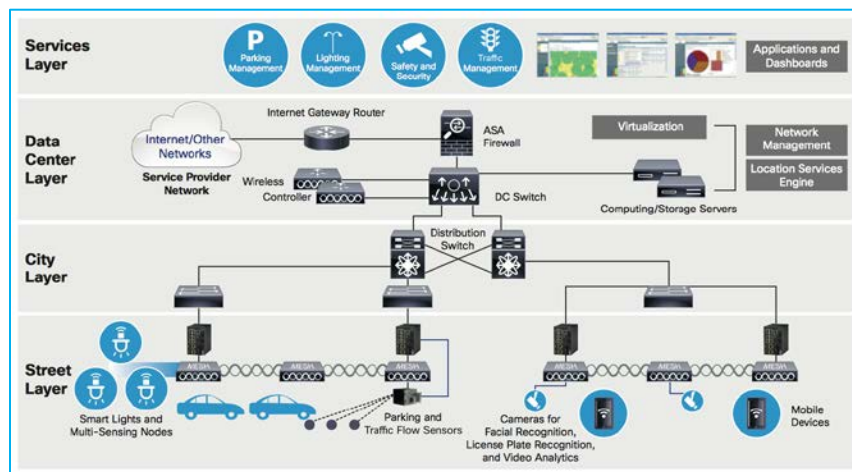
Fog architecture:

- Allows multiple applications to use the same resources at the same time
- Scales as needed by the number of events and dynamic relationships
- Makes information and analyses available quickly; responses are relevant to the immediate context.

Cisco Digital Network Architecture for Cities

Cisco Digital Network Architecture (DNA) for cities is a foundational infrastructure of the Internet of Everything (IoE)—the networked connection of people, process, data, and things. By connecting services to a shared and intelligent infrastructure, Pittsburgh's most critical problems, such as parking, traffic management, lighting, water, and waste management, can be solved. Air, noise, and water-quality sensors provide insights to help agencies make better sustainability plans. At the same time, you can provide citizens with Internet

connectivity and access to real-time information about services, such as traffic and parking, all of which improve the overall quality of life in Pittsburgh.

Figure 2. Smart+Connected Digital Solution Architecture

Unify Your Infrastructure, Connect Your City

A typical Cisco DNA solution for cities consists of:

- Core infrastructure—switches, routers, and unified communications platforms
- Wi-Fi infrastructure—wireless access points and controllers
- Network management applications, such as Cisco Prime™ products
- Location services engine to deploy location-based mobile services.

The solution also supports multiple-use cases in the area of city infrastructure management, including:

- **Smart Lighting:** Street lighting systems can use sensors to control when lights power on and off, based on a time schedule or natural-light sensing. This can significantly lower energy usage and associated costs.
- **Public Wi-Fi:** Citizens can access the Internet over their smartphones, tablets, and other computing devices when they are in public spaces and on the move—for example, to view maps, local business information, or educational content.

Connected Digital Platform

This platform uses cloud technology to deliver storage, virtualization, adaptability, and analytics. Benefits include:

- **Real-time visibility** into Pittsburgh's activities, as well as the ability to perform data analytics on the information
- **Rich, up-to-date information** so Pittsburgh can address crises quickly and efficiently

- **Data analytics** to help you create realistic, long-term plans for further investment in infrastructure and services.

Digital Platform Architecture

Cloud architecture facilitates the addition of services to the platform. The platform supports cross-domain services as it allows one service to trigger events that affect others. This functionality puts the cloud's device agnostic, secure communications, and geospatial mapping to good effect. By combining information from one domain to another (such as lighting to parking), you can create a service that includes features from both (such as parking space-specific lighting). This results in a smoother onboarding process for new services, and easier development of new business applications.

Open Application Programmer Interface (API) System

The digital platform has an open API system for application developers. Pittsburgh controls access to the development environment, which includes a sandbox and simulated data for developers' domains of interest, allowing you to create an App Store for the City. Moreover, you can allow aspiring developers to use the environment to develop an application. Once approved, the application can connect to the platform and use data from sensors on the ground through the cloud. Open APIs allow supply and demand to connect directly, which takes the guesswork out of what users need. This creates the potential for new sources of business and revenue for Pittsburgh.

Digital Platform Dashboard

The Digital Platform Dashboard is a single, real-time visualization center of your Smart+Connected community infrastructure. From the Dashboard, you can create policies and rules to maximize efficiency and respond to incidents in real-time. Dashboard operators can:

- **Gain deeper insight** by focusing on specific domains or areas
- **Display data as desired**, such as superimposed on a map or zoomed in to a specific device
- **Access historical data trends** to see patterns in device communications and assess the effectiveness of policies and configurations
- **View archived information** to analyze how effectively devices are working and whether investment can be optimized.

Business Model

Requirement

Describe any business model or revenue sharing you imagine supporting your idea. None is required, outside of a basic discussion of the feasibility of your idea based the revenue streams identified above, but the City is interested in hearing any such ideas.

Response

After defining the scope of the work required we will be able to provide a Statement of Work. The Statement of Work can be created based on time and expense of the engineers and project managers involved, or a fixed fee. The Statement of Work will only be fully executed once both parties have agreed on the terms and conditions.

Financing or leasing the project is always available through CDW•G. We have multiple leasing partners that can break down the project into monthly payments based on the timeframe that you find appropriate. Once again, the leasing agreement will not be executed until both parties have agreed with the terms and conditions, and are satisfied to proceed. Moving forward, we will be happy to propose financing options, as well as the terms associated with an outright purchase.

Evaluation

Requirement

Please evaluate of your idea's strengths and weaknesses, with hard data if available. Describe how you would analyze, and recommend we analyze, any data produced by your idea in order to gauge the effectiveness and civic value of the project.

Response

A Vendor with Stability and Experience

As the nation's largest direct response provider of multi-brand technology products and services, CDW•G holds numerous contracts directly and are honored to perform as a reseller on manufacturer-held contracts with state and municipal agencies across the United States. Our 33 years of experience in the IT industry qualifies CDW•G to provide the solution requested in this RFI.

Our broad array of offerings range from discrete hardware and software products to integrated IT solutions such as mobility, security, data center optimization, cloud computing, virtualization, and collaboration. Our product portfolio includes more than 100,000 products from more than 1,000 brands. We provide these solutions through a large and experienced sales force and service delivery team consisting of more than 8,500 coworkers, including nearly 1,400 highly skilled technology specialists and engineers.

We are a leading U.S. sales channel partner for many original equipment manufacturers ("OEMs") and software publishers (collectively, our "vendor partners"), whose products we include in our offerings. We believe we are an important extension of our vendor partners' sales and marketing capabilities. We provide a cost-effective way to reach customers and maintain a consistent brand experience through our established end-market coverage and extensive customer access.

We provide value to our customers by simplifying the complexities of technology across design, selection, procurement, integration, and management. We offer our customers unparalleled service through our large and experienced sales force and service delivery teams. CDW•G's multi-brand offering approach and comprehensive internal resources enable us to orchestrate an entire solution, from beginning to end, to best address each customer's specific IT requirements.

A Strong, Stable, Secure Cisco Partnership

CDW has been selling Cisco since 1996. CDW•G is a wholly-owned subsidiary of CDW, founded in 1998 to focus solely on the needs of our government and education customers. Cisco's Gold Partner program was introduced in 2001 and CDW•G has been a Gold Cisco Partner since 2001 (via acquisition). CDW was also Cisco's first Master Security Partner, first Master Unified Communications Partner, and Cisco's first Master Cloud Builder Partner. Most recently, CDW•G won Cisco's Public Sector Partner of the Year award at Cisco's 2016 Partner Summit.

Things for the City of Pittsburgh to Consider

- **Integration:** Emphasis should be placed on, or additional weight given to, single-vendor solutions that are already integrated and tested together. A manufacturer-validated design is also a major advantage. It allows you to deploy sensors and apps across your network and know that they will function seamlessly.
- **Citizen Engagement:** As more collaborative and distributed dynamics take shape at every level of a city's journey to become "smarter," engagement with citizens becomes critical. A Smart City cannot be founded solely on the vision of technology companies or the ambitious aspirations of the city's elected officials, no matter how well-intentioned they may be. A true partnership with different constituents and community groups gets people involved, engaged, and excited to contribute over the long-term.
- **Economic Development:** Implementing elements of a Smart City initiative will begin driving and fueling trickledown economic growth. Together, these will also translate into many other areas including attracting more businesses, citizen engagement, and continually expanding the connectedness of people, processes, data, and things. By keeping that momentum moving forward, Pittsburgh can become a major engine of economic growth on every level.