

**Statement of Qualifications  
800 MHz Radio System Consulting  
Sumter County, Florida**

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## Executive Summary

Tusa Consulting Services (TCS) is pleased to present this Consultant Qualifications Statement for Sumter County's consideration. TCS fully recognizes the importance and mission-critical nature of public safety radio communications. Modernization and expansion projects to operational radio networks and public safety dispatch centers are particularly challenging since interruptions to communications while work progresses is intolerable.

Our firm has consistently provided such services to many public safety radio network owners in a manner that is virtually transparent to user agencies.

### ***TCS Consultant Team***

Our team of experts embodies those skill sets needed to ensure agency concerns are fully addressed in the form of realistic, constructible upgrade alternatives. TCS founder, Dominic Tusa, will play a key advisory role. We offer supportive engineering services provided by our consultant, Todd Mechler as well as Allen Cutts, Gil Stock, Jack Hart and Tripp Forrest. These technical resources would be available throughout this project's term.

Our staff is experienced in the design aspects of all protocols commonly used in support of public safety radio operations, such as Project-25, EDACS, Pro-Voice, Motorola ASTRO, Smartnet/ Smartzone, OpenSky, Tetra, etc., throughout all FCC licensable radio frequency bands.

Today, TCS personnel are assisting others desiring modernized radio facilities. As

an example, we will soon complete an implementation of a new twelve-site Motorola ASTRO Project-25 digital simulcast network for Johnson County, Kansas. Additionally, we have been selected by Floyd County, Georgia to provide needs assessment, procurement and implementation support of their new eight-site Project-25 digital simulcast network (to be completed in late 2012). Currently we are assisting Bowling Green, Kentucky and the City of Fort Lauderdale in their modernization of aged 800MHz trunked radio systems.

By having both of our project manager, Todd Mechler and our field RF Consultant, Tripp Forrest residing in nearby Tallahassee, Florida we can respond quickly ***and hit the ground running***. Accordingly, we have assembled a set of experienced personnel to support a project scope that includes:

- Investigation of user agency needs;
- Coverage analysis of the City's existing radio systems;
- Consideration of Phase I and Phase II Project-25 technologies;
- Investigation of suitable radio frequency spectrum for both initial and long term needs;
- Evaluation of radio infrastructure assets, to best leverage existing resources;
- Inspection of radio dispatch sites to gain an understanding of processes;

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- Assessment of desired radio interoperability resources;
- Development of conceptual infrastructure, enhancement solutions and cost estimates;
- RFP Specification development and evaluation of downstream vendor responses;
- Inclusion of Acceptance Test Plan specifics as an integral part of Contract Negotiations with the successful proposer (*Key Point*);
- Design of maintenance plan and inclusion of plan requirements during Contract Negotiations with the successful proposer; and
- Provide on-going technical support, to the degree desired, during the Implementation Phase.

***Plan of Action***

Our approach is geared toward providing a flow of ideas and information as our work unfolds. That is, we intend to keep your project team fully aware of our investigative discoveries, progress in understanding current and future needs and development of conceptual solutions involving technology, processes and personnel.

Much has occurred in the field of public safety communications since Sumter County began using conventional UHF and VHF radio systems. To better facilitate our understanding of user expectations and to provide you a near-continuous flow of information, we have structured our project plan into phases having structured, multiple tasks.

*Phase-I* would encompass user interviews and an assessment of existing systems and development of conceptual network solutions. Phase-I would continue by distilling these earlier findings into a single Strategic Plan for a modernized public safety radio network. At the conclusion of Phase-I we would conduct an on-site oral presentation/workshop of the Strategic Plan, inclusive of recommendations and suggestions for moving forward.

The proposed fee for Phases I, inclusive of travel expenses, is \$28,290.80.

Procurement services would embody our proposed *Phase-II*. In Phase-II, TCS would continue work with the development of RFP specifications, proposal evaluations and technical support during the City's contract negotiations with its successful proposer. The proposed fee for Phase-II, inclusive of travel expenses, is \$28,654.60.

Consultant support during the project's actual radio network installation process, if so desired, would be encompassed in an optional *Phase-III*. The scope of work and fee for this additional service would be mutually negotiated once the City has contracted a radio system vendor as a result of the competitive RFP process.

***Authorized Persons***

There are two individuals who are authorized to make representations for TCS as it pertains to this Proposal:

Dominic F. Tusa  
Partner/Founder  
75757 Highway 1082  
Covington, LA 70435  
985-249-6467 Tel

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And

Carl Allen Cutts  
Partner  
3225 Harvester Woods Road  
Decatur, GA 30034  
404-288-2298 Tel

***Declarations***

This Proposal, as presented by Tusa Consulting Services, is in all respects responsive and made in good faith, without collusion or fraud.

The transmitter of this Proposal has the authority to negotiate with Sumter County to achieve any requested Scope of Consulting Service changes and has the authority to execute any resulting contract inclusive of Tusa Consulting Services II, LLC.

**Tusa Consulting Services is not affiliated with any radio system vendor or authorized service agent.**

Our consulting practice is geared toward serving clients with impartial technical expertise that is structured to best serve *your* needs.

***Why Select TCS?***

TCS has been a leader in the communications field and is recognized for its progressive design capability that has been well documented in the industry. Our firm brings full independence. We have no agenda or preconceived ideas on how your system infrastructure or supportive dispatch centers must be configured. That, in itself, is a significant advantage as we can

objectively view the facts and recommend solutions that have no bias.

Historically, our new clients become repeat clients and one project's completion soon merges into another's start. Sustained client relations are possible only when a firm provides a valued service, *on-time and at a fair price*. The fact that many TCS clients of the mid-1990s remain active clients today speaks to our demonstrated ability to provide responsive service.

Our firm has been successful in negotiating contract terms, both in terms of initial and future cost, that are highly favorable to our clients. The so-called "standard" contracts offered by radio vendors are geared toward one purpose, the protection of *the vendor*. *We protect you* by leveraging key experiences gained in similar radio system procurements conducted by TCS personnel around the country.

Finally, with our technical personnel located in Tallahassee as well as Atlanta and New Orleans, you can be assured of a timely response to any questions or needs that might arise suddenly during the course of our continued association.

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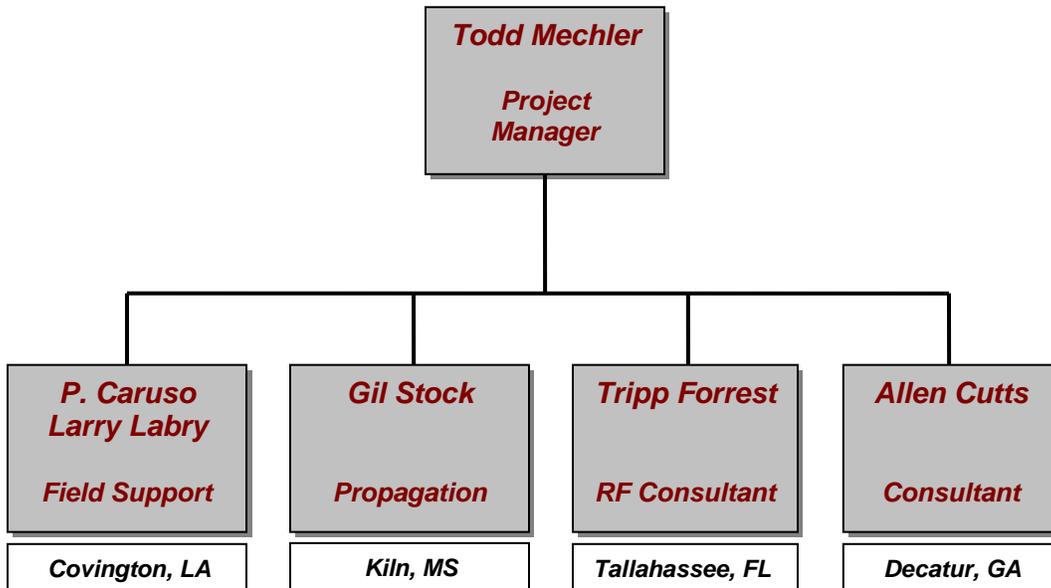
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## Proposed Project Staff and Work History

Tusa Consulting Services (TCS) is headquartered in Covington, Louisiana and has experienced radio communications consultants located in Louisiana, Mississippi, Florida, Georgia and Missouri. Dominic Tusa, founding partner of TCS, will serve as Project Principal. He will provide overall project quality assurance, high-level concept development support and ultimately be responsible for the success of the project. Todd Mechler, having previously worked for the State of Florida as the Director of Medical Communications is very familiar with Florida and the public safety communications requirements mandated by the State. Based in Tallahassee, Florida, Todd will serve as the Project Manager and will be responsible for establishing the design team's coverage, reliability, capacity and configuration criteria for the modified radio network, as well as for providing on-site project consulting services. Our RF Specialist, Tripp Forrest, will support Todd with associated consulting services. Tripp has recently joined TCS and also worked for the State of Florida as the frequency coordinator for SLERS (the Statewide Law Enforcement Radio System) and as the lead engineer for statewide 800MHz radio systems.

Our assigned personnel collectively have significant experience in the design and deployment of both small and large trunked communication systems, including 800MHz trunked simulcast/multisite systems designed and subsequently implemented within the Mid America Regional Council (MO); the City of New Orleans, LA; Kansas City, MO; Franklin, TN; Harrison County, MS; Tallahassee, FL; Hillsborough County, FL and many other networks throughout the midwest and southern states. Each of these systems supports thousands of users and successfully processes many *millions* of call transmissions each month.



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**The TCS Team for Sumter County:  
*Experienced in Large and Small Scale Project-25 Deployments***

The following describes the general project responsibilities of each of the various TCS team members:

**Dominic F. Tusa**, Principal, will monitor the work progress and in concert with Allen Cutts will evaluate and grade vendor responses to RFP Specifications. Additionally Mr. Tusa will provide contract negotiation services as his level of experience in contract negotiation matters spans 30 years.

**Todd Mechler**, TCS Project Manager. He will develop conceptual voice radio solutions and prepare necessary block diagram representations of voice, data and backhaul concepts. Todd will provide on-site consulting and system verification/testing services as necessary during the project's implementation phase. He will also perform the necessary infrastructure site surveys and user interviews.

**Allen Cutts**, consultant is located in Decatur, GA. Allen will manage the TCS consultants in their respectively assigned activities supporting the development of conceptual solutions and execution of phase-indicated tasks.

**Gil Stock**, Propagation Specialist, is based in Kiln, MS. Gil will be responsible for the execution of coverage modeling for the existing system as well as conceptual multiband solutions, if necessary.

**Tripp Forrest**, RF Consultant based in Tallahassee, FL. Tripp will provide supportive on-site services, participate in user interviews and coordinate 800MHz frequency acquisition as necessary.

**Peter Caruso**, Dispatch Center consultant, is based in Covington, Louisiana. Pete, will provide supportive services related to radio dispatch centers to include radio console configurations, ergonomics, call recording systems, etc.

## Experience/Ability

Sumter County, Florida operates radio communication systems supportive of public safety and local government operations. Historically, these radio systems have evolved as user departments sought to improve communications effectiveness within the context of departmental missions.

In the beginning, radio systems used a form of conventional technology that, frankly, did not lend itself well to resource sharing. Departments were assigned individual frequencies by the FCC to conduct mission-specific tasks. Later with the advent of trunked radio technologies, and the radio spectrum necessary to support their proliferation, it became possible for multiple departments to operationally share the same communications resource.

Today's digital public safety radio networks and technologies are progressing at a greatly accelerated rate. Now, Sumter County faces a decision point in selecting a modernized, interoperable radio technology amid expanded user needs and coverage challenges. To gain the maximum benefit from available finances, it is generally necessary to bring in experienced outside technical resources to help elected officials in their consideration and selection of the most advantageous solution.

But, what criteria should be used to select the *right* consultant? Generally speaking, a radio consultant candidate should possess skills in the following areas:

***Investigation:*** Ability to properly survey and document user expectations,

evaluate current infrastructure and user equipment conditions, antenna tower structures, environmental factors, electrical systems and/or supportive mechanical systems directly impacted by this modernization effort.

***Analysis:*** Provide the experience and demonstrated ability to thoroughly analyze, evaluate and recommend modernization solutions as well as possess the ability to conduct stress and load studies on existing towers and the identification of potential new, "greenfield" antenna sites.

***Planning:*** Assist in the development of accurate cost studies for the purpose of securing funding to complete Sumter County's enhanced radio communications network. Additionally, the selected consulting firm should have the ability and proven expertise to evaluate and recommend improvements designed to enhance radio infrastructure survivability during natural disasters, such as tornadoes, floods or hurricanes.

***Implementation Support:*** Ability to provide on-going technical support during the project's needs assessment, procurement phases and, if later directed, during the project's implementation phase.

Since our start in 1992, TCS has focused solely on public safety communications and exceeding client expectations. The following explains how and why Tusa is the right choice for Sumter County.

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Tusa Consulting Services (TCS) encompasses a complete, multi-faceted Project Team with the breadth of experience necessary to complete the various tasks that may be required, inclusive of needs assessments, conceptual designs, budgetary analysis and specification development. Additionally, our firm's personnel have the necessary technical depth to provide ongoing project management services, implementation monitoring services, network verification oversight and to successfully conclude the resolution of punch-list items should those services later become necessary.

TCS is geared to provide resources that are thoroughly familiar with today's public safety radio solutions. We are aggressively focused toward growth and continue to add new, experienced communication experts. Where newly secured consultants or strategic alliances provide technical advantages to clients, we apply those resources where appropriate. For example, in a recent Fort Lauderdale modernization project TCS teamed with URS Technologies to provide an expansive set of mechanical and electrical engineering services key to that client's existing-site reuse.

In every case, clients *always* have full control over the TCS resources assigned to their specific project. With our depth

in experienced personnel we can readily adapt to and support variable client requirements.

It is critically important for radio consultants to quickly grasp the needs and expectations of their client's user agencies and departments. When tasked with evaluating potential alternatives, a consultant's fundamental understanding of client needs is vital not only in the selection of best suited technologies but also in the ultimate implementation and cutover of that new technology.

We meet that challenge, head-on.

TCS has extensive experience in the successful design and deployment of public safety communication networks within some of the harshest environments. For example, Mr. John (Jack) Hart, has been a radio communications professional for nearly 40 years and has provided recent communication design services to the City of New York's Police and Fire Departments. Jack's breadth of experience provides the added peace of mind in knowing TCS recommendations are backed up by proven, front-line experience.

*Our breadth of experience and depth in personnel assure clients that their projects are:*

- 1) Designed for survivability in the face of demanding environmental challenges;*
- 2) Consistent with recognized standards for Public Safety communications;*
- 3) Sensitive to budget constraints;*

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4) Presented with minimal risk to the Client's public safety community; and

5) Presented with the least intrusion possible to ongoing, critical communications.

### **Recent Experience with Wireless Engineering at All Levels**

Dominic F. Tusa, founder of the firm, began his career in the field of commercial radio communications shortly after graduating from Tulane University (BSEE) in 1975. While TCS' technical background includes all areas of radio and microwave communication, our firm's primary focus for the past fifteen years has been public safety communications.

TCS provides a broad range of technical services, which include:

- Existing System Suitability
- Needs Assessment Studies
- Conceptual System Design
- Radio Coverage Modeling
- Specification Development
- Proposal Evaluation Services
- Negotiation Support
- Project Management/ Oversight
- Technical Grant Support
- Talkgroups and Radio Personalities
- Performance Testing
- Administration Assistance

Beginning in 1977, Mr. Tusa's initial communications background focused on the State of Louisiana's petrochemical industry, where he designed hundreds of radio and microwave communication sites throughout the Gulf of Mexico and

adjacent coastal areas for companies including Exxon, Gulf Oil, Chevron, Texaco and others.

***Nowhere in the world are communication systems subjected to more physical, environmental and operational abuse than those within this hostile offshore Gulf of Mexico environment.***

Today, our body of installed and owner-accepted radio systems has reliably operated through fog, hurricanes and ice storms. This excellent experience is critically important to public safety operations where system failures are intolerable.

### **Wireless Engineering Expertise**

TCS' expertise spans land-mobile radio deployment, network connectivity (e.g. microwave systems), and interoperability solutions. The following gives an indication of our capabilities and services in these key areas.

#### ***Land-Mobile Radio***

- *Design and implementation of wide-area paging and 800 MHz trunked networks for private and public industry.* Typical radio system configurations we've designed involve multiple transmit/ receive sites and methodologies to link centralized terminal facilities via private microwave and leased telephone circuits.
- *Design-Implementation of Simulcast/Multisite Public Safety Networks.* Today, many public safety agencies require the enhanced coverage performance which simulcast

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transmitter configurations can best provide. We have successfully implemented such complex systems in rural settings, as well as large locales. Examples are New Orleans, LA, Kansas City, MO, Franklin, TN, Harrison County, MS, Jackson County, MS, St. Tammany, LA and Hillsborough County, FL. TCS has new large-scale simulcast radio implementations now underway in Kansas City, Missouri and Floyd County, Georgia.

- *Design and implementation of pipeline SCADA systems operating in VHF, UHF and 900 MHz spectrums.* Configuration developments include master site(s) placement, link propagation analyses and radio-modem interfaces. In June, 2010 TCS was selected to assist the Washington-St. Tammany Electric Cooperative with the development of a SmartGrid communications network. This network will encompass 960MHz as well as 2/6GHz solutions.
- *Design and implementation of secure VHF/UHF radio networks that support public safety and critical infrastructure offshore and inland oil exploration activities.* Services typically include hardware specification, site requirements, propagation studies, FCC/APCO license application submission, preparation of cost analyses, evaluation of vendor proposals and installation supervision.
- *800MHz Rebanding Assistance.* TCS is currently assisting over forty clients through the rigors of 800MHz rebanding. Services provided typically include assessment of current LMR infrastructure, frequency interference analysis, hardware specifications, site

requirements, migration planning, and assistance with contract negotiations, implementation oversight and acceptance testing.

- *VHF/UHF Narrowbanding Assistance.* TCS has been following the developments of the FCC's ordered refarming of spectrum below 512MHz for the past twelve years. As a result of this FCC Order, we have been assisting clients, such as Lincoln Electric, with configuration changes to older systems as well as the design of replacement P-25 radio systems in the new 700MHz spectrum. Many see this new spectrum as a viable alternative to co-channel skip interference intrinsic to VHF and UHF operations.
- *Thorough Knowledge of APCO Project 25 Standards.* TCS has provided conceptual design solutions for standards-based Project-25 trunked and conventional radio networks for Shaw Air Force Base, Cannon Air Force Base and USMC Camp Butler (Okinawa, Japan). These system designs operate in both VHF and UHF radio bands.
- *Technical grant language support.* Our personnel have been successful in the acquisition of millions of grant dollars in the support of system design and implementation. TCS can lend assistance and technical guidance if your County is pursuing grant funding for your project.

TCS completed a conceptual design report for Brevard County, Florida for the future deployment of an integrated voice/data 800MHz trunked Project-25 radio system having direct interoperability with the State of Florida's ongoing 700/800MHz statewide deployment. We were also

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retained by the City of Franklin, Tennessee to provide technical and implementation services for their new three-site, simulcast 800 MHz Motorola ASTRO-25 Public Safety Trunked Radio System. This system's implementation was successfully completed in June 2007.

Today, we are providing technical services to Johnson County, KS, Floyd County, GA, the Cities of Jacksonville, Fort Lauderdale and Kansas City, MO, and the Mid-America Regional Council in a set of radio modernization projects that encompass Project-25 objectives.

### ***Microwave Radio***

- *Expansion and modernization of 2/6GHz communication networks.* Services delivered to critical infrastructure and public safety clients include the preparation of circuit record cards, wiring schematics, channelization plans, baseband filtering schemes, and rack/ building layout documentation.
- *Signaling design and project execution management.* Responsible for network configuration, design of specialized multiplex and signaling systems and provision of technical assembly assistance for the then-largest privately owned pipeline microwave network, having a traffic capacity exceeding 1800 simultaneous voice-grade circuits. In 2007, TCS developed a three-loop OC-3 redundant microwave network concept supportive of Missouri's Mid-America Regional Council's interoperability and E911 needs. This network is now being deployed with completion expected by Year 2011.

Today, TCS continues to provide microwave network consulting assistance

with a new system designed for Independence, MO, that began implementation in June 2010. Practical experience gained through the successful implementation of such systems throughout the hostile Gulf of Mexico environment have been directly applied to the needs of public safety radio and microwave infrastructures.

For example, 800MHz simulcast trunked systems we designed for St. Tammany Parish, LA, Harrison County, MS, and Tallahassee, FL. Each employed battery backup systems (not traditional UPS devices) to sustain as many as 12-hours of continuous radio operations and 48-hours of microwave functionality. Use of robust battery backup systems allow for continued operations during emergencies where damage to local utilities and standby generator systems may have occurred.

### ***IP-Based Networks***

- *Global network design, implementation, and maintenance.* For example, a global bandwidth network containing multiple IP networks and Frame Relay networks using multiple T1s and E1s between Europe and North America, utilizing OSPF, SNMP, DHCP, NAT and DNS.
- *Configuration, installation and trouble-shooting of LAN & WANs.* Isolate and diagnose common network problems, respond to emergency and priority support calls in a fast and effective manner and provide users with technical support, responding to their needs and questions.

### ***Interoperability Solutions***

TCS has been instrumental in developing public safety interoperable solutions

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since the implementation of our first simulcast system design, the City of New Orleans, in 1992. During the initial planning for this complex New Orleans radio network, it became apparent that the traditional methods of interoperability (i.e. relaying of messages and/or initiation of audio patches by radio dispatchers) were cumbersome and inefficient. Many of the hundreds of radio users interviewed felt that it took too much effort to talk to those on differing radio networks and frequency bands.

Our approach, in 1992, was quite different than other industry-accepted solutions. Since trunked radio system controllers had the intelligence to readily identify the presence of each user radio on a network and the specific talkgroup a given user had selected, we reasoned, then why couldn't the same network controller have the ability to alias specific interoperability talkgroups to specific conventional channels? By so doing, user radios could, in the field, individually select interoperability links as easily as an 800MHz talkgroup and not involve a third-party dispatcher. Therefore, by sharing these innovative, conceptual visions with the City's radio network vendor, we achieved this new measure of trunked system interoperability.

Leveraging this early success, subsequent TCS-designed radio systems have required *automatic interoperability solutions* to varying degrees, whereby users have more control over communications availability with outside systems. These innovative approaches have facilitated interoperability between varieties of proprietary trunked radio system solutions: Smartnet II, EDACS, LTR and even GE-MARC.

In 2005, we were involved with the implementation of ACU-1000 patch

systems at the City of New Orleans' Fire Communications Headquarters. Termed NOMIC, or *New Orleans Maritime Intercommunications Committee*, this auxiliary patch system was the result of limited interoperable communications between federal, state and local agencies in the aftermath of a Mississippi River ship incident. Here, the Chinese-flagged ship, Brightfield, lost power and crashed into the Riverwalk Shopping Mall. No one was seriously injured however the incident highlighted the lack of radio interoperability between municipal and federal agencies.

NOMIC has been successfully deployed in both training exercises and real-world incidents, however, ACU-1000 based-patch technologies rely on a trained radio dispatcher to set up and tear down patches at the conclusion of an event. Newer technologies, such as NetworkFirst and MotoBridge, have the capability of eliminating the need for dispatcher supervision. Further, these most sophisticated of interoperability solutions allow for field users to initiate communication pathways at will, thereby merging host and outside radio systems into one homogeneous network.

Most recently, we have taken on a most significant interoperability challenge through the design of a *network-of-systems* architecture for the Mid-America Regional Council which encompasses Kansas City, Missouri/Kansas. Valued at over \$220 million, this regional Project-25 interoperable VHF, UHF and 700/800MHz voice and data communications network, when completed, would encompass nine counties, nearly 110 tower sites and approximately 30,000 public safety/local government radio users.

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Successful interoperable solutions are those which are so functionally transparent that their capabilities become fully intertwined with those of normal operations. In our experience, an optimally configured radio solution is one where field users or dispatchers can setup and knock down interoperability linkages as easily as changing talkgroups.

Interoperability requires a significant financial investment that, fortunately, has received support from the federal government. For example, in the aftermath of the September 11<sup>th</sup> terrorist attacks, we assisted the City of New Orleans, Louisiana in its development of Community Oriented Policing (COPS) Grants for their procurement of innovative, interoperable communications technologies. As a result of our assistance, the City was awarded a \$7.5-million grant for the development of a regional interoperable communications platform.

Recognizing that any radio system's infrastructure reliability is dependent upon site interconnectivity, TCS successfully assisted the Mid America Regional Council in securing a \$3.5M interoperability grant. This extended Kansas City's area microwave connectivity to other local-area radio systems, thereby allowing secure communications across existing, disparate radio infrastructures.

By working together, we can facilitate sound, forward-thinking planning whereby solutions developed today have the flexibility to meet tomorrow's challenges.

***Environmentally Hardened Designs***

The survivability of public safety radio communications networks, during and in

the immediate aftermath of ice storms, hurricanes, floods or tornado activity, is of paramount importance. The recent events of Category-5 Hurricane Katrina, where commercial communication services (broadcast television, broadcast radio, cellular, ESMR, paging, telephone, cable, Internet and radio-broadband) were disrupted throughout a 83,000 square mile area, demonstrated clearly that our nation's public communications infrastructure is fragile at best.

During both localized and wide-area catastrophic events, it is critically important that public safety radio communications remain operational. Yet, for many communities, the harsh reality is that critical life-safety radio networks often share the same fate of their commercial counterparts: *total system breakdown*. Using a recent example, while most public safety radio networks within those areas directly impacted by Hurricane Katrina immediately failed (some failures sadly occurred many hours *before* actual landfall), there were three notable exceptions: The City of New Orleans, LA, St. Tammany Parish, LA and Harrison County, MS.

Those three radio networks shared one aspect in common: *they were all designed by TCS*.

The TCS design philosophy for public safety communications survivability is based on the premise that *every* radio system will sustain damage during the high winds and flooding associated with hurricanes or the weight effects of ice. However, by merging infrastructure redundancy concepts with rigorous, yet elegant, design approaches *we can maintain* key network operations and functionality.

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The addition of Jack Hart to our consultant firm brings a new, but critically important aspect to our design thinking: ***Infrastructure Hardening to Survive Terrorist Acts***. Jack Hart has for the past several years been assisting the City of New York Police and Fire Departments (through his prior association with iXP) in developing survivability techniques in Today's terrorism challenge.

While it is important to build radio networks tough and resilient, each is comprised of many non-radio subsystems. Towers, generators, fuel supplies, battery systems, microwave linkages and a host of other elements require on-going maintenance to assure radio network availability. While hardening affords a network with the potential to survive, proper, rigorous maintenance is the "fuel" for reliability and survivability. TCS personnel have developed excellent maintenance plans, whose value has been field-proven multiple times throughout the past, highly-charged hurricane seasons. This field-tested expertise will, of course, influence the design strategies and approaches we develop for you.

### **Assessing Vendor Technologies, Equipment and Performance**

TCS has developed technology assessment and feasibility reports for a variety of public safety clients over the past 12 years. As an example, for the Cities of Fort Lauderdale and Tallahassee, Florida we completed reports that encompassed product and service trends for both public safety voice (radio) and mobile data. As part of those reports, TCS investigated open standard (*APCO Project-25*), commercial (e.g. Nextel), and

proprietary voice radio solutions, inclusive of both FDMA and TDMA formats.

Furthermore, our investigation of mobile data wireless platforms included traditional low bandwidth (25KHz channel) private radio approaches, emerging Project-25 trunked and medium speed technologies, potential utilization of 700MHz wide bandwidth data network via a Scalable Adaptive Modulation approach, wireless LAN 802.11 hot spot solutions, MESH-type wide area, highspeed technologies and interim/long term use of 3-G commercial, cellular-based solutions.

### **Understanding of Key Industry Standards and Processes**

In order to provide a client with timely and accurate information related to emerging technologies and accepted practices, it is imperative that the selected consultant have knowledge regarding technical standards and future trends. Based on our experience, a standards-based digital trunked radio communication solution would likely include the following:

- Upgraded survivability standards for public safety radio communication facilities;
- Wide-area interoperability;
- Disaster/disruption scenarios and recovery modeling;
- Best practice recommendations for disaster communication survivability;

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- IP-Based digital backhaul network;
- Ability to handle voice and high performance data;
- Interoperability with regional Public Safety/Emergency Services and act as model for future phases of interoperability within the region;
- Backward compatibility with all existing 800MHz, VHF, and UHF systems; and
- A turnkey approach that maximizes the use of existing resources to protect client investment and maintain cost efficiency.

*Development trends toward Digital Voice Communications provide enhanced features and functionality.* Owners of analog radio networks often desire to adopt standards-based digital voice platform for public safety radio operations however, the pathway to new technology has many branches. Owners face the confusing and sometimes conflicting choices of updating/modernizing current vintage infrastructures, consideration of other proprietary technologies or implementation of a standards-based Project-25 configuration.

As newer digital technologies gradually evolved, vendors made adaptations to their analog infrastructure schemes to take advantage of the improvements to voice clarity and security via digital modulation schemes. Radio network vendors have used the Improved Multiband Excited (IMBE) vocoder as the basis of their digital voice overlays and,

until recently, these approaches had been proprietary enhancements to their Project 16 solutions. Federal requirements for standards-based Project-25 radio networks through the military and other branches of federal government have spurred the deployment of Project-25 IP-based radio networks, which are not directly interoperable with earlier Project-16 deployments.

Furthermore, many key benefits are expected to be achieved by adopting packet-digital technology for voice communications. These include call security, enhanced audio clarity, reduced backhaul/site connectivity costs (IP versus traditional circuit-switched technology) and enhanced interoperability with legacy VHF, UHF and proprietary 800MHz radio networks. In fact, the entire public and private communications industry is adopting and transitioning toward fully-digital packet switched network technologies where older circuit-switched technologies (as used in older analog and many proprietary digital radio solutions) will gradual fade from use. Most important of all, the communication industry's rapid migration toward IP digital technology provides a much greater capacity to project desired information systems and applications, peripherally, into the patrol car. By so doing, public safety vehicles can readily become field extensions of the office environment, whereby information can be transacted, efficiently and securely, regardless of location.

*Wireless data technology is evolving at a rapid pace.* Today's favored wireless data technology may be suddenly overtaken by newer, more efficient or elegant rivals. In tradition private radio networks, we have seen a rapid evolution of data rates from

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9.6kb/s to 19.2kb/s to, most recently, 96kb/s within narrow 25KHz bandwidth voice-radio channels. Commercial carriers routinely support Public Safety wireless data communications on the order of 400kb/s and beyond.

In the private network environment, we also have seen the emergence of technologies utilizing the 700MHz spectrum, as well as the newly allocated 4.9GHz spectrum. Broader changes now being considered by the Federal Communications Commission may pave the way for both private as well as public/private CDMA on 1.25MHz bandwidth, 700MHz channels, thereby allowing data rates beyond 3Mb/s over large geographic areas. The propagation characteristics of this new band are virtually identical to those of existing and well understood 800MHz allocations. Future 700MHz operations present essentially no unique coverage prediction issues and may be the answer to public safety's need for reliable, high-speed performance throughout large geographic areas. Furthermore, public safety's recently allocated 4.9GHz band permits the development of fully licensed and protected wireless (microwave-band) mesh-technology solutions having sufficient channel bandwidth to support data rates in excess of 6Mb/s.

These rapid advances in wireless voice and data communications technology open new doors to innovative network design approaches. Software adaptable hardware platforms for networks and user equipment will permit designers and network planners to better manage the cost, migration timelines and forward-looking expansion plans thereby providing flexibility to previously rigid network solutions.

*Any new or modernized radio communications network of the scope envisioned for Sumter County may, by its very nature, become a significant technical and financial undertaking.*

Best practices in procurement, contracting and project management are needed to enable decision makers to make the best vendor and technology choices, thereby protecting the City's sizable financial investment. Later, careful planning would be needed to ensure a smooth migration onto the new network and to prepare the necessary interoperability infrastructures to develop **efficient and reliable interoperability** linkages with systems operating on differing frequency bands and technologies. Due to the dependence of public safety personnel upon reliable radio communications, it is crucial that the design, implementation and migration of the many technologies and supporting subsystems be successful and fully satisfies user expectations.

Our firm's *demonstrated expertise* in both the design and implementation management of complex radio networks provides added client value in streamlining the total process from concept to fully-accepted deployment.

### **Propagation Analysis**

The single most important aspect of any radio communications system is coverage. More often than desired, the situations that police, fire and rescue personnel experience place heightened demands on hand-held radio performance. The radio, in essence, supports an invisible lifeline between the user, the dispatcher, and others performing identical tasks. No matter

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how difficult the situation, a radio-equipped user is never alone *provided* that specific factors influencing radio coverage were fully investigated, understood and considered during the system's design.

Too often, however, user needs are not fully understood by radio network managers, equipment manufacturers, system sales personnel *and, sadly, by text-book consultants lacking real-world experience*. Vital information on how the field user intends to operate his equipment (i.e. within vehicles and/or dense buildings) may receive only superficial consideration from an inexperienced designer. The net result can be "Swiss cheese" coverage and widespread user discontent. A coverage deficient radio system can quickly degenerate from a valuable resource to an expensive liability.

The advent of high-speed desktop computing has ushered in an era of unprecedented precision in the development of modern public safety communication systems. Ten years ago, it was necessary to install test transmitters within a given locale to predict the degree of coverage attainable from individual antenna sites. However, today's abundance of actual signal strength test data from constructed cellular, commercial and public safety communication networks has permitted the development of highly accurate loss prediction models. These models, coupled with enhanced manufacturing data from antenna system manufacturers and established Industry standards for coverage verification (TIA/TSB-88B), now allow engineers, equipment vendors and consultants to rapidly design coverage-compliant radios systems to a

level of reliability and accuracy that was uncommon in the early 1990s.

The tool engaged by Tusa Consulting Services, *ComSite Design*, uses a Graphical User Interface to manipulate complex radio propagation equations (Okumura Adaptive Model) and displays the results graphically as a user coverage map. System variables such as tower location, coaxial cable type and length, antenna type, height and orientation, radio type (portable and mobile), power output and acceptable signal level are entered into the program. Terrain specific characteristics of the area under investigation such as roads, terrain type and topography are also integrated into the program by incorporating United States Geodetic Survey data into the model and overlaying this information onto the predicted coverage map. With all of this information carefully entered into the program, coupled with the network implementation experience of our personnel, the computer model is then able to accurately predict radio performance for both portable and mobile users operating within a given service area.

The propagation modeling software will also indicate those specific areas that may experience sub-optimal or distorted coverage, thereby alerting the system's designer to potential coverage shortfalls. If the predicted coverage area does not meet the service needs of users throughout a desired geographical service area, the designer can then further adjust system variables or add sites until the predicted coverage coincides with the desired service area. This iterative design approach permits coverage model convergence toward a best, optimized solution.

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The intent of most clients is to leverage *existing* facility resources. Therefore TCS normally initiates coverage modeling of existing radio systems to gain a fixed performance benchmark. Our investigation might then consider mobile as well as on-street portable coverage. The results of this initial investigation would be evaluated in the context of user input. Large differences between predicted versus user reports are often indicative of infrastructure deficiencies such as damaged antennas, feed lines or tower-top receiver amplifiers. Any variances would be reported to the client for potential corrective action.

TCS has the ability to conduct and analyze actual signal level measurements of portions or all of a client's radio system service area to allow for a precise understanding of existing, delivered coverage. The process of collecting signal level data is, again, tied to industry-recognized, reproducible techniques described by EIA/TSB-88B.

The signal collection equipment owned and used by TCS is manufactured by Berkley-Varitronics (Panther series). It includes four programmable radio receivers, each of which is capable of collecting up to 512 samples per second. As configured, this RF signal level tool can collect data from as many as twelve 800MHz simulcast transmitter sites at a time (receivers for VHF/UHF investigation support as many as four separate sites).

This combination of measured versus calculated performance allows TCS personnel to better understand the local area conditions that exist throughout a client's desired coverage service area. Using the measured results, we can tailor environmental parameters in the

coverage modeling tool to converge with real-world conditions. The net result is a set of coverage predictions for hypothetical new sites/technologies that are accurate representations of what one could realistically expect from a constructed system.

***The importance of gaining a firm understanding of each client's coverage expectations cannot be overstated.***

This single aspect drives all new network designs. Errors of understanding, whereby the designer, vendor or project management team incorrectly assumes that a lower level of coverage reliability can be made acceptable will lead to a disappointing, possibly disastrous, result. Once constructed, an underperforming system becomes a target for highly-vocalized criticism and is an expensive liability to correct. A prime example of this is the West Palm Beach Open Sky project.

Our approach and resident radio propagation skills ensure that any resultant new technology or conceptual solution will satisfy coverage needs, with the highest degree of certainty.

### ***Envisioned Project Staff***

Tusa Consulting Services would provide comprehensive technical support throughout Counties' radio network evaluation and design development process. And, if desired, TCS could efficiently provide on-site project implementation services throughout all stages of the modernization project.

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***Dominic F. Tusa***

Principal-founder for TCS will serve as Technology Advisor for Sumter County project. He will provide high-level concept development support. Additionally, Mr. Tusa will serve as the senior technical advisor for the engineering team's frequency plan, infrastructure/ user equipment audits, and statements of work development, coverage verification, reliability and conceptual solution development.

A resident of Covington, Louisiana, Tusa is a 1975 graduate of Tulane University and has a Bachelors of Science degree in Electrical Engineering. He holds an FCC commercial General Class radio license and is a licensed Extra Class amateur radio enthusiast (K5EF).

Drawing from a professional career span of 30 years involving virtually every aspect of public and private radio communications (HF-SSB, analog and digital radio systems, private microwave, voice and data, multiplex and telephony signaling systems), Mr. Tusa has a documented record of successful, high performance radio solutions.



***Allen Cutts***

As a radio consultant for Tusa Consulting Services, Mr. Cutts will provide project management and consulting support. He has over five years experience in Public safety communications in the design and

specification development of 800MHz voice/data trunked radio networks, including Motorola's Astro 25 digital system, Motorola's TETRA System and M/A-Com's EDACS system. Mr. Cutts has an additional eight years experience in Product Engineering and Project Management, plus over eleven years experience in LAN/WAN networks. His expertise includes knowledge of IP routing, Cisco routers and Catalyst switches, Frame Relay, Virtual LANs, in addition to an understanding of Wireless LANs and their requirements. Mr. Cutts is also a Project Manager for Floyd County, Georgia, and leads the 800MHz rebanding effort for Henry County, Georgia and Harrison County, Mississippi.

Mr. Cutts is an Electrical Engineering Technology graduate of Clemson University and holds a FCC Extra Class (N4OZI) amateur radio license

***Gilbert G. Stock, Jr.***

Chief Operations Officer and Radio Consultant for Tusa Consulting Services will provide support activities for analysis of digital radio communications technologies, as well as radio coverage modeling for both existing and conceptual configurations.



***Jack Hart***

Jack Hart has a range of experience that spans forty years and encompasses all aspects of public safety radio communications. Originally based in the New York City area but relocated to Kansas City, Jack has been very active in developing radio

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network enhancements in the Post 9/11 Era. These include:

- Little Silver, NJ – upgrade of dispatch system and implementation of new 500 MHz Smartzone trunked network control stations
- New York City Fire Department – installation of new towers, upgrade of VHF Conventional base stations and dispatch consoles, development of new telephone interconnect scheme
- New York City Fire Department – supported the design of an Emergency Command Board for use at fire scenes
- New York City Police Department – modifications of existing 911 backup consoles for UHF network
- City of New York –Emergency Communications Transformation Project – supervise consolidation of all public safety dispatch operations post-September 11, 2001 – new consoles, T1 telco interconnection network, base stations, backup Emergency Control Station deployment – Combination of VHF/UHF Conventional and 800 MHz Smartzone systems
- New York State – planning for deployment of Statewide Wireless Network (M/A-COM “Open Sky, 700/800 MHz)

Prior to his work described above, Jack was employed as a project manager by Motorola. There he successfully completed the following key projects:

Smartnet Trunking -

- Statewide networks for the NJ State Police and NJ Transit, simulcast

- Citywide system for the New York City Department of General Services – 1 TX, 5 RX sites
- Citywide network for the City of New Britain, CT – 2 site simulcast
- Citywide network for the City of Boston Police – 3 site simulcast

Conventional systems -

- City of White Plains Police and Fire Departments - UHF base station and dispatch upgrade
- NY City Department of Corrections - new portable radios
- NY City Transit Authority - new portable radios

Data systems -

- New York City Fire Department – initial 800 MHz MDT system
- Maersk Terminals – MDT network for shipping container movement/tracking
- Boston Police Department – MDT network
- Several small “status signaling” systems for delivery trucks, etc.

Jack is a graduate of Cathedral College, NY, a fellow of the Radio Club of America and has been a licensed Extra Class amateur radio operator (WA2HWJ) for the past 50 years.



***Peter Caruso***

Recently retired from the New Orleans Fire Department, Mr. Caruso has broad experience in the field of public safety radio and E911 communications dispatching, having started his career as a radio dispatcher in 1971. He had managed the City of New Orleans, Louisiana’s Fire Communications Dispatch Center for the past 14 years. During that period, Mr. Caruso was directly responsible for the preparation of

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dispatch center staffing reports, workload forecasts, operating cost budgets, implementation of CAD, Radio, Telephony and related technologies. Instrumental in the Department's Herculean restoration of dispatch facilities in the aftermath of Hurricane Katrina, his efforts were recognized through a *Certificate of Commendation* for service performed during Hurricane Katrina.



***Todd Mechler***

RF Communications Consultant for TCS, Todd will provide the necessary support for infrastructure site surveys, user interviews and on-site project consulting services. Building upon 15 years of two-way radio communication and tower/site experience, eight years of which was with the U.S. Air Force, Todd will leverage his experience with large scale vendors to support maintenance program design and negotiation.

Having previously worked for the State of Florida as the Director of Medical Communications, Todd has an extensive background in the design and management of statewide radio communications systems to include grant writing, budget analysis and propagation analysis.

A resident of Tallahassee, Florida, Todd has a BS in Electrical Engineering, with a specialization in RF propagation, from Florida State University. He is currently pursuing a dual Master's Degree in Electrical Engineering and Public Administration.

Todd also currently supports on-going consulting TCS projects with the Cities of New Bern NC, and Fort Lauderdale, FL as well as Pasco County FL, and Harrison County MS.

## **Approach and Methodology**

### ***Understanding of RFP Objectives***

Sumter County has determined that its existing public safety radio system must be upgraded in order for Public Safety Agencies within the County to be able to maintain their operational status. Therefore, a comprehensive analysis of the current system has been requested to identify potential alternatives and to determine an optimal approach toward system upgrade or replacement. The functional age of the fielded infrastructure equipment coupled with limited parts support, flagging software support and interoperability deficiencies are potential reasons for considering a network modernization.

Many key benefits could be achieved by adopting advanced radio technology. Call security, enhanced audio clarity, reduced backhaul/site connectivity costs (IP versus traditional circuit-switched technology) and expanded interoperability with legacy VHF, UHF and proprietary 800MHz radio networks are some of the advantages possible using digital technology. In fact, the entire public and private communications industry is adopting and rapidly transitioning toward fully-digital, packet-switched radio network solutions. This envisioned communications modernization will place the County squarely within the mainstream of ongoing technological developments and potential eligibility for Federal grant funding initiatives.

Most important of all, new radio solutions provide a much greater capacity to project desired information systems and applications, peripherally, into the patrol

car, fire apparatus or emergency transport. By so doing, public safety vehicles can become field extensions of the office environment, whereby information can be transacted, efficiently and securely, regardless of location. A modernized radio network will become a significant technical and financial undertaking. Therefore, best practices in procurement, contracting and project management are necessary to enable decision makers to make fact-based choices, thereby protecting the County's sizable financial exposure.

Finally, careful planning would be needed to ensure a smooth migration onto the newly upgraded or modernized network and to prepare the necessary interoperability linkages to systems operating on differing frequency bands and technologies. Due to the growing dependency of public safety personnel upon reliable radio communications, it will be crucial that the design and implementation of a new network's many technologies and supportive subsystems be successful and satisfy user expectations.

Therefore, Sumter County's desired radio enhancement should consider, minimally, the following:

- IP-Based site interconnectivity;
- Conversion to a higher capacity configuration (use of enhanced multi-channel equivalency technologies such as TDMA);
- Enhanced radio coverage reliability, particularly within building structures;

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- Utilization and/or compatibility with new 700MHz spectrum currently available in the state;
- Enhanced ability to handle voice, data, and imagery communications (combined land mobile and broadband technology platforms);
- Compliance with Federally approved digital voice initiatives (i.e., APCO Project-25, SAFECOM, etc);
- Seamless interoperability with adjacent county public safety agencies;
- An implementation approach that maximizes the use of existing resources to protect the County's investment and to maintain cost efficiency; and
- Utilization of a no-break, dual network migration scheme throughout the new network implementation and acceptance testing process.

Our firm has the demonstrated ability to steward technology enhancements to live, operational public safety trunked/simulcast communication systems. We've done them for the City of New Orleans; Kansas City, Missouri; Jackson County, Mississippi; Hillsborough County, Florida; Tallahassee, Florida and Harrison County, Mississippi . . . ***and always successfully.***

***Fulfilling the  
County's Requirements***

The primary goal of our team's proposed assistance is to provide qualified and

objective advice, guidance and assistance in a manner that facilitates Sumter County's desire for a timely, cost-effective and successful radio network enhancement.

In our proposed set of services, Tusa Consulting Services (TCS) will be focused and committed to ***fully satisfy your*** RFP's assessment and modernization objectives. We will commit these personnel resources to complete this project's needs assessment and conceptual design phases in a timely, schedule-driven manner.

In order to develop a clear definition of consultant requirements, and to explore the complex technology and cost-benefit issues involved with potential solutions, the TCS approach and methodology focuses on several key areas:

- Understanding of user agency current and future needs, as well as final configuration expectations;
- Identification of existing infrastructure assets, in order to maximize the existing communication investments of Public Safety radio systems within the County;
- Understanding of the present radio system's coverage, capacity, reliability, functionality attributes and shortfalls (to ensure that the newly proposed configuration and technology concepts exceed existing-system performance);
- Use of coverage modeling tools to evaluate new system coverage potentials and conceptual new tower sites as well as technology configurations ***and*** to provide a coverage test/signal level collection service geared to ***exactly*** profile the

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performance of the existing radio network;

- Use of risk mitigation techniques;
- Development of RFP specifications for release to potential new-system vendors;
- Technical support during subsequent vendor contract negotiations; and
- Ongoing project management to assure the timely and accurate submittal of individual task report submittals.

TCS' proposed tasks are flexible and customizable, based on the County's needs and requirements. That is, this proposed project methodology is not etched in stone. It can be further customized, at your direction, during subsequent contract negotiations. With TCS Consultant Todd Mechler providing hands-on project oversight, our personnel will maintain a near-continuous, open dialog with Sumter County's Project Team. Todd's near-local presence (Tallahassee, Florida) facilitates our adaptation to the normal ebb and flow of information gathering, potential shifts in project focus and risk discussions, as such events arise.

### ***TCS Phased Approach***

The following describes our Proposal's project phases and their assigned tasks. As completed, these phases naturally drive the work toward a successfully deployed solution.

## **Phase I: Needs Assessment/Concepts**

### **Task 1.1**

#### ***Project Initiation***

During this task, we will meet with the County's designated project management team and other key personnel to confirm the project organization and the roles and responsibilities of the project participants. We will also identify County resources that must be contacted as part of the project. Areas we intend to cover include:

- Introduction of TCS team members;
- Review of the Project's Scope of Work;
- Review of contracted work plan, and schedule; and
- Confirmation of communications and progress reporting procedures

As part of this task, we will also work closely with the County's Project Manager to define project management standards, processes, report formats and metrics that will be used throughout the course of the modernization project. We will seek to adapt our processes to mirror those already in use by the County.

As Project Manager, Todd will also provide project status reports, via email, during the course of the project. These reports will identify key accomplishments during the reporting period, expected accomplishments during the upcoming reporting period and identification of risk issues requiring management attention. The objective of these reports and discussions is to ensure that high-level management issues, as well as numerous operational and technical issues, are

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identified early and managed throughout the contracted period.

The Project Initiation task will require no more than 12 total consultant hours.

**Tasks 1.2**

**Understanding of User Needs**

TCS will conduct on-site interviews with County identified user groups, inclusive of public safety/local government agencies now utilizing Sumter County's existing radio resources. These interviews will follow a set interview format designed to extract information that identifies from the user's perspective key advantages, disadvantages, shortcomings of the existing radio system as well as desired network improvements and long-term communication needs. TCS shall provide an interview questionnaire format in advance of any on-site interviews, thus County designated personnel would have time to collect that data necessary to successfully conclude each interview session.

We will review the data collected through these on-site interviews and distill this information into an *Interview Report Submittal* that depicts immediate requirements, goals, functional expectations, acceptable levels of interoperability and long term operational requirements. This level of assessment will be conducted for voice and data needs in order to integrate both into a cohesive communication network approach. Cohesive, in this context, means leveraging similarities that accomplish the ultimate goals for voice and data wireless communications. By so doing, we intend to identify efficiencies that enhance both the implementation and have potential to reduce cost. That is, the technologies necessary to transport

voice and data will be optimized to provide the best, most flexible solutions for both needs without compromising one approach at the expense of the other.

***An understanding of user needs (manager-user-dispatcher) is absolutely the most important step in the development of the future total communication network concept.***

Without a firm, solid and accurate understanding of agency needs and radio user expectations, a designer risks developing conceptual solutions that satisfy relatively few users and fall below agency expectations. In short, the project fails.

There have been many cases, reported in print media or on the Internet, where costly and highly complex radio system deployments have failed to meet user expectations. In nearly all cases, *and in particular those where TCS has been later retained to review work products of previous consultants or vendors*, those failures were the result of either improper application of the technology or a failure to understand and appropriately address user expectations.

History suggests that the proposed Needs Assessment task is critically important to the success of the County's modernization project.

It is anticipated that TCS would require up to 16 consultant and 6 administrative hours to complete on-site interviews and to develop an Interview Report Submittal. Based on our experiences, the time spent in fully defining goals and expectations early will expedite convergence toward a set of realistic and constructible modernization solutions.

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**Task 1.3**

**Evaluation of Existing Facilities**

An important aspect of managing new-system deployment costs is the leveraging of existing site infrastructure resources, when such reuse is appropriate. Typically, reusable resources could include towers, tower sites, building facilities, dispatch centers, HVAC systems, microwave connectivity and emergency power systems.

In this proposal, TCS personnel would evaluate existing primary/backup radio infrastructure sites as well as radio dispatch centers. We will specifically evaluate County radio and dispatch sites for each of the specific criteria:

- Type/models of installed infrastructure equipment;
- Assessment of existing configuration rack/ cabinet placements;
- Assessment of space to install new system equipment in parallel with existing;
- Assessment of HVAC and existing electrical power systems to support dual network loads;
- Determination of FCC/FAA tower registration numbers and as-licensed site coordinates;
- Assessment of lightning protection systems;
- Assessment of radio site fire suppression systems; and
- General assessment of existing tower structure feasibility (excludes tower

load analysis, but is available through TCS as an optional service).

TCS will conduct a per-site evaluation of electrical grounding system integrity, using a clamp-on ground resistance tester, at each of the four radio infrastructure sites as well as associated dispatch centers. TCS will report its findings immediately to the County for evaluation and, where necessary, advise of necessary corrective action.

This task would require 16 consultant hours.

Should it become necessary and subsequently requested by the County for us to complete tower load studies by a State-registered professional structural engineer, which is work that is outside the scope of this base-level assessment, such work would be quoted as an additional service.

**Task 1.4**

**Coverage Verification**

The single-most important aspect of any radio communications system is coverage. More often than desired, the situations that police, fire and rescue personnel experience place heightened demands on hand-held radio performance. The radio, in essence, supports an invisible lifeline between the user, the dispatcher, and others performing identical tasks. No matter how difficult the situation, a radio-equipped user is never alone, provided that specific factors influencing radio coverage were fully investigated, understood and considered during the system's design.

TCS would perform coverage modeling of the existing system configuration using

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information obtained earlier from the infrastructure survey (Task 1.3).

We would also conduct actual, on-site signal level testing throughout State/County road-accessible areas of Sumter County. The purpose of this field testing is to calibrate the computer coverage modeling tools to local environmental loss conditions. By so doing, resultant coverage predictions for later conceptual solutions would be as accurate as possible and would not rely on “normalized” or “textbook” assumptions.

TCS would then compare and evaluate the coverage of the existing network using both this real-world signal level data as well as results from radio propagation modeling software. This enhanced computation would serve as an existing system baseline and will help reconcile reported coverage shortfalls as determined through user interviews.

As part of our base coverage evaluation services, a series of coverage maps would be developed. These would include:

1. Talk-In and Talk-Out coverage for the existing tower/antenna sites. Supplied maps would consider both mobile and portable on-street operations.
2. Coverage predictions for current first-generation digital voice operations, if any.

TCS envisions a total of 68 consultant hours in completing the field signal level data gathering. If, however, the County desires only a relative coverage assessment of the existing radio systems, TCS would agree to removal of this signal

level verification task subset from the Scope of Services and Fee Proposal.

A maximum of 24 consultant hours would be required for the development and submittal of representative coverage maps as described for this base set of coverage assessment services. The coverage assessment results would be submitted for client evaluation as a *Coverage Assessment Report* deliverable.

**Task 1.5**

**Radio Dispatch Center Analysis**

It is important for the Consultant to evaluate the suitability of existing radio control equipment and related radio console devices in the context of an enhanced communications infrastructure. Thus, TCS would identify those equipment groupings, if any, that would have an ongoing relevance in the context of a new, modernized radio network.

The envisioned on-site dispatch center equipment assessment is included in our infrastructure inspection activity.

**Task 1.6**

**Develop Infrastructure/User Equipment Requirements - Voice Communications**

A substantial cost for the deployment of any new or enhanced radio communications system is directly attributable to the quantity, features, accessories and types of user equipment ultimately selected. Radio vendors manufacture a host of products covering many needs, from low-tier radios having a limited set of talkgroups, systems and capabilities to the highest-tier radios that are operable on multiple bands (700/800MHz) in multiple formats (Project 25, Astro/Smartnet II,

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SmartZone, EDACS or OpenSky) and may even be capable of digital voice encryption and over-the-air (OTA) reprogramming.

Analog 800MHz radio users, particularly those considering P-25 functionality, would have a variety of new features available that may be different from past experiences. The quantity and mixture of desired user radios is likewise reflective of the complexity and reliability performance criteria expected of the host infrastructure network.

TCS would develop a baseline set of likely user equipment needs in accordance with information provided by County radio system users. This baseline configuration will be in a form that could be released to potential vendors for comments and equipment quantity revisions, if so desired. The equipment list will serve as the foundation for subsequent user equipment cost budget development.

This task would leverage work completed in Task 1.2 but would require an additional 8 consultant hours to complete agency specific user equipment templates.

**Task 1.7**

***Conceptual System Coverage Design***

Utilizing the coverage verification information derived by Task 1.4, TCS would renew its propagation modeling with the aim of addressing known coverage shortfalls and anticipated new-area growth profiles. Ultimately, this work will drive the configuration of potential modernized network solutions.

The advent of high-speed desktop computing has ushered in an era of unprecedented precision in the

development of modern public safety communication systems. Fifteen years ago, it was customary to install test transmitters within a given locale to predict the degree of coverage attainable from individual antenna sites. However, today's abundance of actual signal strength test data from constructed cellular, commercial and public safety communication networks has permitted the development of highly accurate loss prediction models. These models, coupled with the manufacturer's data from antenna system producers, and established standards for coverage verification (TIA/TSB-88B), now allow engineers and consultants to rapidly design coverage compliant radios systems to a level of reliability that was unheard of in the early 1990s.

The tool engaged by Tusa Consulting Services (Comsite Design) uses a Graphical User Interface to manipulate complex radio propagation equations (Okumura Adaptive, Longley-Rice, etc.) and displays the results graphically as a user coverage map. System variables such as tower location, transmission line type and length, antenna type, height and orientation, radio type (portable and mobile), power output and acceptable signal level are entered into the program.

Terrain specific characteristics of the area under investigation such as roads, terrain type and topography are also integrated into the program by incorporating United States Geodetic Survey data into the model and overlaying this information onto the predicted coverage map. With all of this information carefully entered into the program, the computer model is then able to accurately predict radio performance for both portable and mobile users operating within a given service area.

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The propagation modeling software will also indicate those specific areas that may experience sub-optimal or distorted coverage, thereby alerting the system's designer to potential coverage shortfalls. If the predicted coverage area does not meet the service needs of users throughout the desired geographical service area, the designer can then further adjust system variables or add sites until the predicted coverage coincides with expectations. This iterative design approach permits coverage model convergence toward an optimized solution for the frequency band considered.

If the intent of the County's assessment and network modernization is to leverage *existing facility resources*, TCS would consider use of the existing radio system sites plus new "greenfield" or other existing tower or building rooftop settings that could overcome known coverage deficiencies and support new/future coverage needs (a "greenfield" site is any location where construction of an antenna site may be viewed as technically beneficial, but where no tower structure currently exists).

After the initial consideration explained above, TCS will develop VHF, UHF and 700/800MHz coverage prediction overlays utilizing desirable existing sites as well as new sites. This investigation will consider mobile, portable on-street and portable in-vehicle configurations.

Development of new radio network site/coverage profiles will require 8 consultant hours, 4 administrative and 4 drafting hours.

**Task 1.8**

**Voice Communications Network**

At the conclusion of Task 1.7 we will have identified the total number of sites, and their approximate locations, necessary to support multiple conceptual radio network solutions. The TCS team would then devise infrastructure configurations that parallel and support each coverage-defined conceptual solution.

The Interview Responses (Task 1.2) would suggest the type of network topology needed. If the requirement is for stringent in-building portable radio coverage, it is possible that urban/suburban areas would require simulcast transmitter technology (coupled with receiver voting) to provide sufficient signal levels and fade margin to overcome expected propagation losses. In other instances, ribbon-type configurations whereby individual radio tower sites are networked via a multi-site switch may be the best solution (if cost issues can be balanced through the availability of sufficient new channels).

TCS will next develop detailed conceptual design descriptions, block diagrams, pictorials and other details necessary to convey an overall description of each supplied enhancement/modernization concept.

TCS will additionally develop detailed cost budget information, inclusive of infrastructure hardware, installation services, software, backhaul interconnectivity, user equipment and dispatch facilities, as needed to fully configure and support each conceptual solution. The output of this task will be included within our *Final Assessment and Recommendations Report*.

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Development of these voice radio concepts will require 8 consultant hours, 4 administrative and 5 drafting hours.

**Task 1.9**

***Backhaul Infrastructure Solutions***

The successful and reliable operation of any multi-site conventional or trunked radio communications system is contingent upon the resiliency and availability of the many data, audio and control linkages used to interconnect antenna sites. These linkages, whether accomplished by leased circuits, wired facilities or private microwave, are essential to the seamless integration of individual sites, having limited coverage, into a large network having the combined coverage of all sites.

***The reliability of site backhaul infrastructures has an immediate impact on radio network functionality and coverage.***

For example, loss of a leased telephone linkage serving two radio sites could silence both sites. Users would suddenly discover a major loss of coverage, possibly affecting a very large portion of the network's service area. From the user's perspective, "the radio system failed" whereas the true problem was far removed from the radio system, itself. Therefore, well defined networks should consider and evaluate the possibility of multiple levels of backhaul redundancy to prevent single points of failure.

Through field experience we have seen where integration of an FCC-licensed microwave subsystem is a key component to public safety radio network survivability. Microwave connectivity also has useful applications for E-911/radio dispatch functions, as well.

For example, if regional/municipal dispatch facilities were likewise interconnected via the radio network's microwave subsystem, it would be possible for the centers to easily share telephone connections, CAD, records management, audio recording and other data-related technologies. Use of live video conferencing to support meetings between separate dispatch centers or involving Department of Homeland Security, FEMA and other outside agencies could be instantly configured in response to local emergency conditions.

The expansive broadband digital bandwidth available through today's licensed microwave technology could become the mechanism that allows separate dispatch centers to operate seamlessly and in concert.

With respect to new-system conceptual solutions envisioned for Phase I, we would consider traditional licensed microwave loop-switched technology as well as star-configured alternatives as long as rigid expectations for survivability in adverse conditions can be met. In this conceptual development phase, TCS would provide a high-level design and cost estimate for backhaul elements necessary to support the County's voice and data conceptual solutions.

Task 1.9 would require 8 consultant hours and 7 drafting hours.

**Task 1.10**

***Interoperability: County, Regional and State Levels***

TCS will work with the County and other interested parties to gather the information necessary to thoroughly discuss concepts geared toward

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development of potential regional interoperability solutions. This groundwork will assist in the review of what networks are already in place, replacement networks being planned, or future networks needed.

TCS will conduct appropriate outside interviews with up to five County identified regional user agencies. The proposed interview team would consist of one TCS representative and one or more County project observers.

We will review the data collected and distill this information into matrix sets that pictorially depict immediate requirements, goals, minimally-acceptable functionalities and long term requirements. This level of assessment will be conducted in order to integrate all into a cohesive interoperable communication network approach.

An understanding of host-system needs, involving not only Sumter County, but also any adjacent municipalities is an important step in the development and assessment of interoperability solutions. Without a firm, solid and accurate understanding of agency needs and radio expectations, consultants and system owners risk considering interoperability solutions that satisfy relatively few users and fall below regional expectations.

It is anticipated that TCS could require up to 16 consultant hours and 4 administrative hours (a maximum of five interview sessions is considered, however, additional sessions can be added, time permitting) to complete and document these on-site, adjacent-area interviews.

**Task 1.11**

**Conceptual Report & Recommendation**

Each of the above described tasks will have impact and result in a Phase I deliverable report that fully depicts a future course for radio network enhancement. This Report will present multiple conceptual solutions that meet identified needs, using differing technologies, frequency bands and cost.

Later in Phase I while working in concert with the County's project team, TCS will assist in the determination of a single network solution (Strategic Plan) that provides the best balance between requirements, present needs, coverage, future needs, features, network functionality, reliability, interoperability and cost.

The *Phase I Conceptual Report* deliverable will include, minimally, the following information:

- Conceptual description of potential voice network solutions;
- Detailed description of user equipment requirements;
- Conceptual description of backhaul connectivity solutions;
- Description of dispatch configurations;
- Radio interoperability schemes;
- Detailed cost definition for each proposed solution; and
- Consultant recommendations (short and long term).

This task will require 16 hours of consultant participation and 4 hours of administrative support.

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**Task 1.12**

**Conceptual Design Oral Presentation**

The submission of the Task 1.11 Report signals the end of the consultant's investigative and conceptual design activities. Next, TCS would conduct an on-site oral presentation of our conceptual design findings.

This task, to be completed at the County's direction, would require 12 consultant hours.

**Task 1.13**

**Determine Procurement Approach**

TCS will analyze the pros and cons of sole-source radio infrastructure/user equipment procurement versus an open, competitive procurement. TCS will identify strengths, weaknesses and issues associated with each procurement alternative and present them to the County's Project Team for review and discussion. Examples of issues to be addressed include:

- Vendor capabilities;
- Vendor technologies;
- Ability of procurement plan to meet County requirements, especially the need for interoperability with jurisdictions in adjacent cities and regions;
- Ability of the procurement plan to be seamlessly migrated within the scope of normal user operations;
- Potential impact on proposed costs;
- Potential impact on project schedule; and

- County purchasing requirements.

Our consultant team will work with the County's Project Team to determine the best, most advantageous procurement approach to follow and to document the basis for the decision.

Although many radio procurements are structured as turnkey from one vendor source, the simplicity of administering a single contract has a cost. Our RFP experiences suggest that radio vendors discourage their supply of outside services such as tower construction, site-civil work, microwave subsystems, deployment of standby power systems, etc., since these all fall outside of the radio vendor's core business set. The penalty for securing these services as part of a turn-key approach is a grossly inflated markup in the service cost, as well as associated factory and on-site project management services costs. In one recent sole-source, turnkey proposal TCS ... and its client ... were disappointed and dismayed to witness outside services "markups" of 50% or higher.

This procurement approach investigation task would require 8 consultant hours.

**Task 1.14**

**Develop Strategic Plan**

TCS will convert the information gathered in the preceding steps into the County's final radio configuration requirements plan. The requirements will provide both an overview of County priorities and objectives, as well as detailed information that will require the vendor to specifically respond regarding its ability to meet requirements. TCS will provide this same level of project description for supportive infrastructure needs involving towers,

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shelters, emergency power systems and microwave site interconnectivity.

Additional information developed within this task will include the consolidation of information describing not only what is expected of the new network, but how it must, minimally, meet those expectations and what means of testing will be required of the vendor to assure performance compliance with Specifications.

The Consultant shall develop and submit a *Final Strategic Plan Report* that depicts the technical, operational and cost aspects of the selected network configuration.

This task will require 8 consultant hours.

**Task 1.15**

**Final Report Oral Presentation**

The submission of the Task 1.14, signals the end of the Consultant's development of the selected radio network configuration scheme. TCS would next conduct an on-site oral presentation of this Strategic Plan Report and collect comments for use in Phase II, Procurement.

This task, to be completed at the County's direction, would require 12 consultant hours.

**Phase II: Procurement**

Once the final network configuration desired by the County is firmly established and a suitable funding source has been secured, the consultant would receive approval to develop procurement specifications. Next, as the formal network procurement steps are concluded, the consultant would conduct

a formal evaluation of vendor proposal submittals, rank all using a weighted point system and provide to the County a vendor selection recommendation for consideration.

The following describes our proposed approach to Phase II process tasks and resultant deliverables.

**Task 2.1**

**RFP Specification Development**

TCS will combine the required technical and purchasing language into a draft RFP Specifications-Procurement Document(s). The specifications would also contain safeguards to assure that the various new systems are constructed in accordance to recognized industry standards, achieve proposed coverage and service levels, and are completed in a timely, professional fashion.

A typical RFP Specification should encompass the following technical elements:

- Description of existing radio system configurations;
- Description of participant user needs and expectations;
- Identification of network functionality requirements;
- Description of service area and coverage needs;
- Identification of dispatch radio console locations and functionality;
- Description of desired infrastructure reliability factors;

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- Description of minimally acceptable radio interoperability requirements;
- Equipment shelter requirements, where necessary;
- Tower shelter requirements, where necessary;
- Standby power systems;
- Infrastructure connectivity;
- Electrical grounding system requirements;
- Description of radio network alarm systems;
- Development of functional and coverage Acceptance-Testing criteria; and
- Development of fully encompassing maintenance contract terms.

A draft Specification would be released to the County's Project Team for comments, additions or other recommendations. Desired changes would be incorporated into a final Specifications Document. At the County's direction, specifications would next be released as a Project Request for Proposal (RFP) from qualified vendors.

Development of draft and final specifications documents and attendance at one draft review workshop session would require 75 consultant hours and 6 administrative hours.

**Task 2.2**

**Evaluation Worksheets and Criteria**

TCS will develop worksheet templates, concurrent with Task 2.1, which would be used to evaluate vendor proposals in a

consistent, fair and impartial manner. These worksheets will be custom-designed to enable a comprehensive comparison and will allow many details of each proposal to be summarized in an objective, point-structured format to enable the evaluation and selection process.

TCS will also present a recommended Proposer Evaluation Criteria template to the County's Project Team for review and comments. Once revised in accordance with Team direction, this template would define the criteria used to throughout the proposal evaluation process. If a quantitative or weighted method is used, the criteria will define that process. The evaluation criteria should be included as part of the RFP Specifications (in accordance with County procurement practices) so prospective vendors clearly understand the County's objectives and approach.

Completion of the evaluation worksheet submittals will require 24 consultant hours and 4 administrative hours.

**Task 2.3**

**Pre-Proposal Conference Participation**

TCS will participate in a pre-proposal conference by assisting the County, as needed, in answering or clarifying specification-related questions and in the preparation of subsequent written project addenda.

This task will require 16 consultant hours.

**Task 2.4**

**Evaluation of Vendor Proposals**

Multiple resources within the TCS team will review and evaluate each vendor

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proposal and independently complete and total evaluation worksheets as prepared for each proposal received. TCS will then prepare a summary that identifies the strengths and weaknesses of each proposal as well as any items needing additional clarification.

Using our approach, any potential for bias toward a particular vendor solution set is eliminated and vendors, as well as the County, are assured that each set of evaluations has been conducted in an honest and fair-minded fashion. It is strongly recommended that members of the County's Project Team likewise evaluate vendor submittals using our same evaluation process.

Use of evaluation worksheets as described would result in a numerical grade for each proposal, in a manner that directly and accurately correlates with the published evaluation criteria. That vendor having the highest numerical evaluation score would receive our recommendation for selection.

We have most recently completed a procurement and evaluation process for Kansas County, Missouri that mirrors the above described procurement and vendor selection approach. You are encouraged to contact our listed City of Kansas City reference, Mr. Ed Brundage, to gain insight on how well this TCS proposal evaluation process has worked, from a client's perspective.

The evaluation of vendor proposals will require 16 hours per proposal. Anticipating two viable proposals, the total task will require 32 hours.

**Task 2.5**

**Assistance with Contract Negotiations**

Following vendor selection, TCS would assist the County in negotiating contracts with the various successful vendors. TCS is not a law firm and does not provide legal advice. However, TCS has considerable experience in developing fair and reasonable contracts for major communication networks. Our system approach focuses on key issues, which results in the achievement of successful, industry-recognized, implementations.

Examples of issues that TCS would address during contract negotiations include:

- Owner implementation responsibilities;
- Vendor implementation responsibilities;
- Performance standard identification (coverage, capacity & reliability);
- Acceptance testing procedures;
- Issue resolution processes;
- Pricing guarantees;
- Payment schedules;
- Project time line development;
- Performance and penalty requirements;
- Identification of project personnel; and
- Warranty/maintenance responsibilities.

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From the County's perspective, success gained through contract negotiations is directly related to the strength of the original RFP specification coupled with the experience of its crafting consultant. If the specification is strong and leaves little room for ambiguity of requirements and functional/technical expectations, contract negotiations are normally smooth and always favorable to the County.

Two of the more important points of contention within any contract negotiation process are the specifics outlined in the Acceptance Test Plan (ATP) and the Maintenance Program.

The Acceptance Test will be the final determining factor in whether or not the vendor has met the desired goals of the County's RFP for a new radio system. If the new system does not meet the performance coverage requirements outlined in Task 1.7 'Conceptual System Coverage Design', then the vendor has failed. With pre-determined and agreed upon specifications outlined in the ATP, a failure in radio coverage becomes the liability of the vendor, not the County,

On more than one occasion, TCS has been brought in to consult on projects that continue to flounder as a result of not establishing acceptance testing requirements during contract negotiations. For example, a vendor for a radio project on Florida's East Coast has failed to provide the coverage necessary for reliable communications, five years into the project. Deficiencies such as these and others described on the Internet, point to examples of underperforming trunked radio systems. These are often rooted in poorly crafted RFP specifications coupled with the lack of comprehensive test plan procedures. A

structured test plan ensures Owners that the radio system, as installed, is the radio system purchased. Thus, it is imperative that acceptance test plan processes become part of the negotiated Contract document, thereby placing the performance burden squarely on the radio system provider **and not you**.

In addition to the Acceptance Test Plan, the specifics of a Maintenance Program designed to protect and prolong the life of your system demand the same level of attention to detail. A well designed maintenance contract should encompass all aspects of Sumter County's radio system. Every component that plays a part in the function of a public safety radio network from the antenna, to the dispatch console, to the radios themselves needs to be part of a comprehensive corrective and preventive maintenance program.

So, what sort of equipment is typically excluded from a radio vendor's "standard" maintenance contract? Unfortunately, it is much of that which usually fails. Examples include: standby power generators, uninterruptible power supplies, batteries, radio system antennas, transmission lines, receiver preamplifiers, antenna distribution systems, transmitter combiners and microwave antennas/systems.

Having worked with numerous clients in the successful negotiation of similar radio maintenance work plans and contracts, TCS has the experience required to deal with overbearing corporations. A good contract will provide performance enhancing "feedback" mechanisms designed to keep the vendor on task. For example we helped negotiate the County of Tallahassee's maintenance contract to include maintenance service response

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failure penalties (\$500 per occurrence). Additionally, through our aggressive efforts, we were able to secure built-in hardware updates as needed to implement new software releases.

Based on prior experience on like-sized projects, contract negotiation support would require up to 40 hours.

In short, TCS will provide whatever level of support is desired by Sumter County throughout the various phases of its enhanced-network implementation. However, since the scope and complexity of the County's actual implementation is unknown at this time it is impossible to give a meaningful cost proposal for this Phase III Implementation service.

Generally speaking, comprehensive implementation services (to the degree described earlier) are based as a percentage of the final contracted project value, as is typical for consulting services of an architectural nature. As an example, for modernization projects whose total value is in the order of \$3 to 5 Million, a consultant firm's implementation fees (inclusive of travel and lodging expenses) may be in the order of 3-5% depending upon complexity and special needs.

In those instances where the owner has personnel on-staff that could assume some of the tasks identified above, the corresponding costs for consultant services can be lessened. Therefore, the true cost for implementation services are fully contingent upon the selected vendor's project time line and the degree of services the owner can conduct, as both impact the consultant's time allocation and, ultimately, the cost.

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## Recent Projects and References

### City of Kansas City, Missouri – RFP Specification to upgrade to P-25 & Implementation Services

City of Kansas City, Missouri  
Mr. Ed Brundage, Radio Shop Supervisor  
414 E. 12<sup>th</sup> Street  
Kansas City, MO. 64106  
816-305-3238  
[edward.brundage@kcpd.org](mailto:edward.brundage@kcpd.org)

Project Dollar Amount: \$35 Million

#### Description

Tusa Consulting Services provided a detailed specification that was presented to vendors for the upgrade of the City of Kansas City's current 800MHz Simulcast M/A-COM EDACS radio system.

The P-25 upgrade will support Public Safety, Police, Fire, and EMS, and Public Service within the City of Kansas City. The proposed network will also support regional interoperability as part of the Mid-America Regional Council initiative for a nine county P-25 network.

Motorola was chosen as the successful vendor for the design and implementation of an 8 site, 24 channel, 800MHz P-25 simulcast radio network that is also being integrated to two existing P-25 networks in the MARC region.

TCS has also been retained for implementation services to include full time Project Management during the projected 18 month or less implementation cycle.

### City of Franklin, Tennessee – Implementation Services

City of Franklin, Tennessee  
Mr. Fred Banner, MIT Director  
109 3<sup>rd</sup> Avenue  
Franklin, TN 37064  
615-550-6604  
[fredb@franklin-gov.com](mailto:fredb@franklin-gov.com)

Project Dollar Amount: \$6.5 Million

#### Description

Tusa Consulting Services was selected to provide implementation services after the City decided not to retain their current consultant. Services included but were not limited to:

- Establish on-site project team
- Monitor vendor progress and report to the city completed activities or deviations from project timeline
- Assist with talkgroup and fleetmap development
- Review vendor submittals and provide recommendations to customer
- Conduct inspection and create punchlist items and final reconciliation of any issues
- Monitor subscriber installation and programming
- Review as-built drawings
- Final Acceptance

The City of Franklin was replacing a legacy VHF/UHF analog system with a Motorola three site, 10 channel, 800 MHz P-25 simulcast radio network.

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**Johnson County, Kansas –  
Implementation Services**

Johnson County, Kansas  
Mr. Walt Way, Director  
11880 S. Sunset Dr.  
Olathe, KS. 66062  
913-826-1010  
[wway@jocogov.org](mailto:wway@jocogov.org)

Project Dollar Amount: \$32 Million

**Description**

Tusa Consulting Services was selected to provide implementation services after the County decided not to retain their current consultant. Services included but were not limited to:

- Attend project meetings
- Participate in detailed design review
- Attend staging of system
- Establish on-site project team
- Inspect vendor work at sites and make recommendations as needed
- Assist with detailed talkgroup and fleetmap development for County, multiple city agencies within the county joining system, and regional structure in-line with the MARC regional initiatives.
- Coverage analysis and approval of system requirements and testing
- Final FTP/ATP of installed system

Johnson County, Kansas is replacing a two site, 18 channel, SMARTNET radio system with a Motorola 9 site, 18 channel, 700/800MHz P-25 simulcast radio network.

**City of Tallahassee/Leon County,  
Florida – Needs Assessment and  
RFP Procurement**

City of Tallahassee  
Ron Wostel, Radio Shop Supervisor  
Communications Division  
642-C Mabry Street  
Tallahassee, FL 32304  
850-544-4868  
[ron.wostel@talgov.com](mailto:ron.wostel@talgov.com)

Project Dollar Amount: \$25 Million

**Description**

Tusa Consulting Services (TCS) was competitively selected to provide consultant services. These services included user needs interviews, site assessment, coverage propagation analysis for conceptual solution, and conceptual design to upgrade their current Motorola Smartnet 800MHz simulcast radio system. This assessment included the feasibility to upgrade to P-25 and enhance coverage within the city/county's defined coverage areas.

TCS developed detailed RFP specifications for a new P-25 radio network. TCS also assisted in contract negotiations with the successful vendor (Motorola) and attended staging of the new 9 site, 15 channel, P-25 simulcast radio network.

This system supports Public Safety and Public Service for the City.

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**St. Tammany Parish, Louisiana**  
**800 MHz Trunked Radio System –**  
**Implementation Services**

St. Tammany Parish, Louisiana  
Mr. Robert Seal  
701 N. Columbia Street  
Covington, LA 70433  
985-875-2197  
[rmd@stpso.com](mailto:rmd@stpso.com)

Project Dollar Amount: \$9 Million

**Description**

TCS was retained in 1998 to conduct a radio communication needs assessment for the St. Tammany Parish Sheriff's Office. TCS developed conceptual solutions and costs estimates, which ultimately resulted in a project to design a five site/8-channel 800 MHz analog/IMBE digital simulcast trunked radio system. TCS also prepared RFP documents and assisted in vendor response evaluations, monitored the work progress of the selected-vendor (Ericsson) and supervised system verification testing.

System became fully operational on November 4, 2001 and is currently serving 1,615 users.

**Harrison County, Mississippi**  
**800 MHz Trunked Radio System –**  
**Implementation Services**

Robert "Gil" Bailey  
15309-B Community Road  
Gulfport, MS 39503  
228-831-0760  
[harrison911@co.harrison.ms.us](mailto:harrison911@co.harrison.ms.us)

Project Dollar Amount: \$18 Million

**Description**

The HCECC radio network includes dual EDACS Pro-Voice analog/digital trunked simulcast systems and a single-site NPSPAC mutual aid subsystem.

Installation of this network commenced in 2001 in the form of a City of Gulfport radio system and was completed in June 2002 (eight operational channels). The County elected to expand the Gulfport radio system for county needs, through the addition of equipment and sites in 2004. These various radio infrastructure sites are interconnected using a private, 6GHz digital microwave subsystem. All radio network sites are located within Harrison County's jurisdictional boundaries, with their associated antenna systems located atop either leased or County-owned tower facilities.

This simulcast five site/40-channel 800 MHz radio communications system currently is serving over 3500 users and supports Public Safety and Public Service for the County.

# Tusa Consulting Services II, LLC - Partial Client List

| Contact Name                                    | Company                         | Address   | Phone        | Project Dollar Amount | Description of Services  |
|---|---------------------------------|---|--------------|-----------------------|--|
| Nicola Jansen<br>Communications Project Manager | Ada County Sheriff's Office     | 7200 Barrister Drive Boise ID - 83704                                 | 208-577-3620 | \$5,000,000.00        | Coverage Services  |
| Contact Name                                    | Company                         | Address   | Phone        | Project Dollar Amount | Description of Services  |
| Malissa Carter<br>Communications Center Manager | Bowling Green Polcie Department | 911 Kentucky Street Bowling Green KY - 42101                          | 270-393-4470 | \$50,000.00           | Needs Assessment   |
| Contact Name                                    | Company                         | Address   | Phone        | Project Dollar Amount | Description of Services  |
| Lesley Lewis                                    | Brevard County                  | Office Of Emergency Management 1746 Cedar Street Rockledge FL - 32955 | 321-637-6670 | \$20,000,000.00       | P-25 Upgrade   |
| Contact Name                                    | Company                         | Address   | Phone        | Project Dollar Amount | Description of Services  |
| G. Patrick Brown, AIA, LEED® AP                 | Burns & McDonnell               | 9400 Ward Parkway Kansas City MO - 64144                              | 816-822-3535 | \$100,000.00          | Sub-Consultant Services<br>(Time Service)  |
| Contact Name                                    | Company                         | Address   | Phone        | Project Dollar Amount | Description of Services  |
| Dan Hood Information Service Department         | City of Blue Springs            | 903 Main ST Blue Springs MO - 64015                                   | 816-228-0232 | \$7,000,000.00        | Needs Assessment, Feasibility Study, RFP Specification and Implementation Services |
| Contact Name                                    | Company                         | Address   | Phone        | Project Dollar Amount | Description of Services  |
| Fred Banner MIT Director                        | City of Franklin                | City Hall 109 3rd Avenue, South Franklin TN - 37064                   | 615-791-1457 | \$6,500,000.00        | 800MHz Simulcast P25 Implementation  |
| Contact Name                                    | Company                         | Address   | Phone        | Project Dollar Amount | Description of Services  |
| Sgt. Rich Rodgers                               | City of Grandview               | 1200 Main Street Grandview MO - 64030                                 | 816-316-4906 | \$500,000.00          | VHF/UHF Refarming  |

| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
|---|--------------------------------------|--|--------------|-----------------------|--|
| Rich Noll   | City of Kansas City                  | 29th Floor, City Hall 414 East<br>12th Street Kansas City MO -<br>64106            | 816-513-1369 | \$35,000,000.00       | P-25 RFP Specification &<br>Implementation Services                                      |
| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Major Scott Lyons                                 | City of Lee's Summit                 | City of Lee's Summit Police<br>Department 10 NE Tudor Road<br>Lee's Summit - 64086 | 816-969-1800 | \$7,000,000.00        | Needs Assessment, Feasibility Study,<br>RFP Specification and Implementation<br>Services |
| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Sgt. Chris Skinrood                               | City of Riverside Police Department  | 2990 NW Vivian Road<br>Riverside MO - 64150  | 816-741-1191 | \$4,000,000.00        | Needs Assessment, Feasibility Study<br>and RFP Specification                             |
| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Ron Wostel  | City of Tallahassee                  | 642-C Mabry Street<br>Tallahassee FL - 32304                                       | 850-891-5626 | \$25,000,000.00       | Needs Assessment, Feasibility Study<br>and RFP Specification                             |
| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Debra Napier                                      | Clay County                          | 12 S. Water Liberty MO -<br>64068  | 816-407-3707 | \$500,000.00          | VHF Refarming  |
| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Troy Bailey                                       | Fort Lauderdale                      | 100 N. Andrews Avenue 6th<br>Floor, Lauderdale FL - 33301                          | 954-828-5790 | \$22,000,000.00       | Needs Assessment, Feasibility Study,<br>RFP Specification and Implementation<br>Services |
| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Michelle Cuevas                                   | Hancock County, E-911 Commission     | P.O. Box 519 Kiln MS - 39556   | 228-493-1226 | \$1,500,000.00        | 800MHz Simulcast Network<br>Optimization   |
| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Stephen D. Mitchell, Director<br>General Services | Hillsborough County Sheriff's Office | 2008 E. 8th Avenue Tampa, FL<br>33605  | 813-247-0972 | \$4,000,000.00        | Network Optimization, 800MHz<br>Rebanding  |
| Contact Name                                      | Company                              | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Mr. John L. Neilsen, Deputy<br>Controller         | Ingham County Controller's Office    | Ingham County Court House<br>P.O. Box 319 Mason MI -<br>48854                      | 517-676-7209 | \$80,000.00           | EDACS Technical Services   |

| Contact Name                         | Company                                    | Address  | Phone        | Project Dollar Amount | Description of Services  |
|--------------------------------------|--|--|--------------|-----------------------|--|
| Kevin Whittaker                      | Johnson County Emergency Communications    | 11880 S. Sunset Drive Olathe KS - 66062                      | 913-826-1005 | \$32,000,000.00       | Implementation Services  |
| Contact Name                         | Company                                    | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Metro. Amb. Svc. Trust               | Matt May                                   | 300 Rivergate Center 600 Broadway Kansas City MO - 641051554 | 913-927-4148 | \$2,000,000.00        | Radio Migration/Dispatch Center  |
| Contact Name                         | Company                                    | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Leslie Porth                         | Missouri Hospital Association              | 4712 Country Club Drive Jefferson MO - 65109                 | 573-893-3700 | \$250,000.00          | Statewide Radio Study  |
| Contact Name                         | Company                                    | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Crystal Waldrop, Purchasing Director | Newberry County                            | 1309 College Street PO Box 156 Newberry SC - 29108           | 806-321-2100 | \$50,000.00           | Needs Assessment, Feasibility Study  |
| Contact Name                         | Company                                    | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Major Jesse McLendon                 | North Kansas City                          | 2010 Howell Street North Kansas City MO - 64116              | 816-274-6014 | \$3,000,000.00        | Needs Assessment, Feasibility Study, RFP Specification and Implementation Services |
| Contact Name                         | Company                                    | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Cathy Pendleton                      | Roanoke Regional Airport Commission        | 5202 Aviation Drive, NW Roanoke VA - 24012                   | 540-563-4838 | \$75,000.00           | Needs Assessment, Feasibility Study, RFP Specification and Implementation Services |
| Contact Name                         | Company                                    | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Mr. Woody Clover                     | St. Tammany Parish Communications District | 501 East Boston Street, Suite 200 Covington LA - 70433       | 985-898-4911 | \$80,000.00           | Safecom (5) Network Conceptual Design  |
| Contact Name                         | Company                                    | Address  | Phone        | Project Dollar Amount | Description of Services  |
| Bob Gass                             | WWL Television                             | 1024 N. Rampart Street New Orleans LA - 70116                | 504-529-6473 | \$148,000.00          | UHF LMR Network Expansion  |

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## Rate Schedule & Fee Proposal

### TCS Resources

TCS maintains its principal office in Covington, Louisiana. Our project manager, Todd Mechler, is based in Tallahassee, Florida and would be your primary consultant resource. Additionally, and in full support of the County's stated objectives, we have committed the services of other TCS personnel, such as Allen Cutts and Gil Stock, coupled with the experienced oversight of Dominic Tusa as a principal advisor.

Should the County desire TCS to continue its support through project implementation, Jack Hart, our firm's most experienced project implementation manager, would supplement the activities of Todd Mechler, Allen Cutts, Tripp Forrest, Gil Stock and other support personnel, as necessary.

### Published Consultant Rate Schedule

The following describes our normal fee structure for technical and support services that are performed on a time and expense basis. For projects of a large scope, the cost for services varies depending upon the project's duration, breadth of services required and economy of scale.

| Technical Resource, TCS Radio | Hourly Rate |
|-------------------------------|-------------|
| Project Principal/Advisor     | \$165       |
| Project Manager               | \$155       |
| Senior Consultant             | \$145       |
| RF Voice/Rebanding Consultant | \$135       |
| Drafting                      | \$ 65       |
| Administrator                 | \$ 60       |

Travel and lodging expenses for TCS' consultants, on time-based projects, are normally invoiced at actual cost without escalation. Sub-consultants used for client-requested activities, such as those involving specialized professional disciplines, such as microwave path surveyors, are likewise invoiced at actual cost without escalation.

### Sumter County's Consultant Fee Proposal

The calculated costs for each task described by our phased approach are indicated in the following tables. Please note that due to the scope of this anticipated project and the on-site proximity of our RF Consultant, TCS has normalized the proposed billing rate for radio consulting services to \$140 per task hour. All above-indicated time rates for drafting and administrative hours apply.

**Statement of Qualifications  
800 MHz Radio System Consulting  
Sumter County, Florida**

Spreadsheets detailing the costs associated with Phases I and II are included below. The cost for Phase I is \$28,290.80. The cost for Phase II is \$28,654.60. The total cost for Phases I and II is \$56,945.40. A discount of 10% will be offered if a contract for consulting services is signed before March 15, 2011.

**Project Phase/Task Consultant Cost Tables**

| Description of Service/Task                                  | Consultant | Rate  | Admin. | Rate | Drafting | Rate | Task Total         |
|--|------------|-------|--------|------|----------|------|--------------------|
| <b>PHASE I: Needs Assessment; Concepts</b>                   |            |       |        |      |          |      |                    |
| Task 1.1 Project Initiation                                  | 12         | \$140 |        |      |          |      | \$1,680.00         |
| Task 1.2 User Needs Assessment                               | 16         | \$140 | 6      | \$60 |          |      | \$2,600.00         |
| Task 1.3 Evaluate Existing Communication Facilities          | 16         | \$140 |        |      |          |      | \$2,240.00         |
| Task 1.4 Perform Coverage Verification                       | 24         | \$140 |        |      |          |      | \$3,360.00         |
| Task 1.5 Radio Dispatch Center Analysis (Done in Task 1.3)   |            |       |        |      |          |      |                    |
| Task 1.6 Infrastructure/User Equipment Requirements          | 8          | \$140 |        |      |          |      | \$1,120.00         |
| Task 1.7 Conceptual System Coverage Design                   | 8          | \$140 | 4      | \$60 | 4        | \$65 | \$1,620.00         |
| Task 1.8 Voice Communications Network                        | 8          | \$140 | 4      | \$60 | 5        | \$65 | \$1,685.00         |
| Task 1.9 Backhaul Infrastructure Solutions                   | 8          | \$140 |        | \$60 | 7        | \$65 | \$1,575.00         |
| Task 1.10 Interoperability: County, Regional and State Level | 16         | \$140 | 4      | \$60 |          |      | \$2,480.00         |
| Task 1.11 Conceptual Report and Recommendations              | 16         | \$140 | 4      | \$60 |          |      | \$2,480.00         |
| Task 1.12 Conceptual Report Oral Presentation                | 12         | \$140 |        | \$60 |          |      | \$1,680.00         |
| Task 1.13 Determine Procurement Approach                     | 8          | \$140 |        |      |          |      | \$1,120.00         |
| Task 1.14 Develop Strategic Plan                             | 8          | \$140 |        | \$60 |          |      | \$1,120.00         |
| Task 1.15 Strategic Plan Oral Presentation                   | 12         | \$140 |        |      |          |      | \$1,680.00         |
| Consultant Hours   | 172        |       |        |      |          |      |                    |
| Services Sub-Total, Inclusive of Travel Expenses             |            |       |        |      |          |      | \$26,440.00        |
| TCS Project Advisor Oversight; 7% of Tasks 1.1-1.15          |            |       |        |      |          |      | \$1,850.80         |
| <b>Phase I Total</b>   |            |       |        |      |          |      | <b>\$28,290.80</b> |

**Statement of Qualifications  
800 MHz Radio System Consulting  
Sumter County, Florida**

| Description of Service/Task                        | Consultant | Rate  | Admin. | Rate | Drafting | Rate | Task Total         |
|--|------------|-------|--------|------|----------|------|--------------------|
| <b>PHASE II: Procurement</b>                       |            |       |        |      |          |      |                    |
| Task 2.1 RFP Specification Development             | 75         | \$140 | 6      | \$60 |          |      | \$10,860.00        |
| Task 2.2 Develop Evaluation Worksheet              | 24         | \$140 | 4      | \$60 |          |      | \$3,600.00         |
| Task 2.3 Pre-Proposal Conference and Addenda       | 16         | \$140 |        |      |          |      | \$2,240.00         |
| Task 2.4 Evaluation of Proposals                   | 32         | \$140 |        |      |          |      | \$4,480.00         |
| Task 2.5 Contract Negotiation Services             | 40         | \$140 |        |      |          |      | \$5,600.00         |
| Consultant Hours                                   | 187        |       |        |      |          |      |                    |
| Services Sub-Total                                 |            |       |        |      |          |      | \$26,780.00        |
| TCS Project Advisor Oversight; 7% of Tasks 2.1-2.5 |            |       |        |      |          |      | \$1,874.60         |
| <b>Phase II Total</b>                              |            |       |        |      |          |      | <b>\$28,654.60</b> |

**Sumpter County, FL**

|  | Task Total  | Cost %  | Hours |
|--|-------------|---------|-------|
| <b>PHASE I: Needs Assessment; Concepts</b> | \$28,290.80 | 49.68%  | 172   |
| <b>PHASE II: Procurement</b>               | \$28,654.60 | 50.32%  | 187   |
| <b>PHASE III: Implementation</b>           |             |         |       |
| <b>Project Total</b>                       | \$56,945.40 | 100.00% | 359   |

| Description of Service/Task                                  | Consultant | Rate  | Admin. | Rate | Drafting | Rate | Task Total         |
|--|------------|-------|--------|------|----------|------|--------------------|
| <b>PHASE I: Needs Assessment; Concepts</b>                   |            |       |        |      |          |      |                    |
| Task 1.1 Project Initiation                                  | 12         | \$140 |        |      |          |      | \$1,680.00         |
| Task 1.2 User Needs Assessment                               | 16         | \$140 | 6      | \$60 |          |      | \$2,600.00         |
| Task 1.3 Evaluate Existing Communication Facilities          | 16         | \$140 |        |      |          |      | \$2,240.00         |
| Task 1.4 Perform Coverage Verification                       | 24         | \$140 |        |      |          |      | \$3,360.00         |
| Task 1.5 Radio Dispatch Center Analysis (Done in Task 1.3)   |            |       |        |      |          |      |                    |
| Task 1.6 Infrastructure/User Equipment Requirements          | 8          | \$140 |        |      |          |      | \$1,120.00         |
| Task 1.7 Conceptual System Coverage Design                   | 8          | \$140 | 4      | \$60 | 4        | \$65 | \$1,620.00         |
| Task 1.8 Voice Communications Network                        | 8          | \$140 | 4      | \$60 | 5        | \$65 | \$1,685.00         |
| Task 1.9 Backhaul Infrastructure Solutions                   | 8          | \$140 |        | \$60 | 7        | \$65 | \$1,575.00         |
| Task 1.10 Interoperability: County, Regional and State Level | 16         | \$140 | 4      | \$60 |          |      | \$2,480.00         |
| Task 1.11 Conceptual Report and Recommendations              | 16         | \$140 | 4      | \$60 |          |      | \$2,480.00         |
| Task 1.12 Conceptual Report Oral Presentation                | 12         | \$140 |        | \$60 |          |      | \$1,680.00         |
| Task 1.13 Determine Procurement Approach                     | 8          | \$140 |        |      |          |      | \$1,120.00         |
| Task 1.14 Develop Strategic Plan                             | 8          | \$140 |        | \$60 |          |      | \$1,120.00         |
| Task 1.15 Strategic Plan Oral Presentation                   | 12         | \$140 |        |      |          |      | \$1,680.00         |
| Consultant Hours   | 172        |       |        |      |          |      |                    |
| Services Sub-Total, Inclusive of Travel Expenses             |            |       |        |      |          |      | \$26,440.00        |
| TCS Project Advisor Oversight; 7% of Tasks 1.1-1.15          |            |       |        |      |          |      | \$1,850.80         |
| <b>Phase I Total</b>   |            |       |        |      |          |      | <b>\$28,290.80</b> |



| Description of Service/Task                        | Consultant | Rate  | Admin. | Rate | Drafting | Rate | Task Total         |
|--|------------|-------|--------|------|----------|------|--------------------|
| <b>PHASE II: Procurement</b>                       |            |       |        |      |          |      |                    |
| Task 2.1 RFP Specification Development             | 75         | \$140 | 6      | \$60 |          |      | \$10,860.00        |
| Task 2.2 Develop Evaluation Worksheet              | 24         | \$140 | 4      | \$60 |          |      | \$3,600.00         |
| Task 2.3 Pre-Proposal Conference and Addenda       | 16         | \$140 |        |      |          |      | \$2,240.00         |
| Task 2.4 Evaluation of Proposals                   | 32         | \$140 |        |      |          |      | \$4,480.00         |
| Task 2.5 Contract Negotiation Services             | 40         | \$140 |        |      |          |      | \$5,600.00         |
| Consultant Hours                                   | 187        |       |        |      |          |      |                    |
| Services Sub-Total                                 |            |       |        |      |          |      | \$26,780.00        |
| TCS Project Advisor Oversight; 7% of Tasks 2.1-2.5 |            |       |        |      |          |      | \$1,874.60         |
| <b>Phase II Total</b>                              |            |       |        |      |          |      | <b>\$28,654.60</b> |

| Comments/Remarks |
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| 4 days           |
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# Todd J. Mechler

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## Key Clients

Harrison County, MS  
Pasco County, FL  
Manatee County, FL  
Fort Lauderdale, FL  
New Bern, NC  
Kansas City, MO

## Key Qualifications

- Radio Network Design
- RF Propagation Analysis
- P-25/EDACS/ASTRO
- VHF/UHF Conventional
- VHF/UHF Narrowbanding
- Grant Writing

## Education

- BSEE, Florida State, 2006
- MSEE, Florida State, 2013
- Airman Leadership School

## Interests

- Amateur Radio (Extra Class) operator and experimenter, AJ4GD
- History, Modern Physics

## Awards

- Airman of the Year, 1998

## Profession

RF Communications Consultant, building upon fifteen years of public safety and military land mobile communications experience. Extensive background in the design and management of statewide radio communications, with key experience in grant writing, budget analysis, RF propagation as well as component level system troubleshooting skills.

## Experience

2007 to April, 2010 **State of Florida Department of Management Services**

- Management of Statewide MED-8 and LMC/SMC MEDCOMM Systems
- Designer of Hospital Health and Medical Interoperability System
- Developed Health portion of Statewide Interoperable Communications Plan
- Designer of Florida's State Medical Response Team's Communications
- Past Sitting Member of the Florida EMS Advisory Council
- Active in FEMA Region IV Interoperability and Air Medical Communications Committees

2003 to 2007 **Florida State University, Student**

- BS Electrical Engineering, Specialization in RF Communications
- Minor in Physics and Mathematics

1995 to December 2002 **United States Air Force**

- Non-Commissioned Officer
  - Top Secret Security Clearance
  - Military Electronics Training
  - Telemetry and Instrumentation Technician
  - Lead Instrumentation Trainer
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# Carl Allen Cutts

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## Key Qualifications

- TETRA Radio Network Designer
- P-25 Simulcast Implementation
- 800MHz Rebanding
- RF Infrastructure Optimization
- Coverage Testing
- Functionality Verification Skills

## Education

- BS Electrical Engineering Technology-Clemson University

## Interests

- Amateur radio operator and experimenter (Licensed N4OZI)

## Profession

Public safety experience in the design and specification development of 800MHz voice/data trunked radio networks, including Motorola's ASTRO 25 digital system, Motorola's TETRA System and Harris' EDACS system. Over eleven years experience in LAN/WAN networks. Expertise includes knowledge of IP routing, Cisco routers and Catalyst switches, Frame Relay, Virtual LANs, in addition to an understanding of Wireless LANs and their requirements.

## Experience

### 2004-Present *Tusa Consulting Services - Covington, Louisiana* **Partner, Senior Technology Advisor**

- Provide feasibility assessments of emerging VoIP radio technologies
- Design of Motorola Astro P25 trunked radio systems
- Development of wide area mobile data communication networks
- Design of Motorola TETRA trunked radio systems
- Specified and documented Harris' EDACS Simulcast systems
- 1996-2003 Concert Management Services/BT/CSC- Atlanta, Georgia
- Network Engineer
- Designed, implemented and maintained the global bandwidth test network using routers, Checkpoint Firewalls and Loop Telecom's Mini-DACS for testing multiple products and services for Concert and BT. This WAN contained multiple IP networks and a Frame Relay network using multiple T1s and E1s between Europe and North America, utilizing OSPF, SNMP, DHCP, NAT and DNS.
- Designed, implemented and documented test cases for new WAN services such as Concert's Fault Management/Performance Management Reports generation for CPE equipment, Concert's provisioning software for PVC migration onto an ATM core, Concert's Fault Management System for NNI PVCs between BTE's IPX/IGX WAN and MCI's HyperStream WAN.
- 1992-1996 LXE – Norcross, Georgia
- Senior Staff Engineer
- Designed and installed wireless LAN topologies utilizing existing network infrastructures to incorporate the latest wireless client server solutions running TCP/IP protocols in addition to guaranteeing 100% RF coverage.
- Designed and installed wireless access points running 450MHz and 800MHz Narrow Band, 900MHz and 2.4GHz WiFi (802.11b) Spread Spectrum technology with IBM 5250, IBM 3270 and TCP/IP emulations.
- Specified and documented both indoor and outdoor RF coverage areas in addition to resolving all RF coverage issues including instances of RF interference.

# Dominic F. Tusa

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## Key Clients

City of Tallahassee, FL  
Kansas City, MO  
Franklin, TN  
Harrison County, MS  
Hillsborough County, FL  
St. Tammany, LA

## Key Qualifications

- Simulcast Network Design
- P-25/EDACS/ASTRO
- VHF/UHF Conventional
- Network Evaluation Studies

## Education

- BSEE Tulane University

## Interests

- Amateur Radio operator and experimenter. Licensed K5EF
- Fabrication of HF no-tune amplifiers using proprietary power coupling devices
- Restoration and collecting of antique radio and scientific devices

## Awards

- Energy Telecommunications and Electrical Association (ENTELEC) Silver Scribe Award
- Co-Recipient of Gulf Oil's Outstanding Achievement Award for 1983

## Articles Authored

- Safe Operation of Electro-Explosive Devices in RF Environment (ENTELEC News, February 1991)
- Choosing a Consultant (APCO Bulletin, September 1995)
- A Structured Approach for the Procurement of Radio Communication Systems (APCO Bulletin, Oct/Nov/Dec 1996)
- Reliable Radio Interoperability in the Big Easy (Public Safety Communications, December 2002)
- In Building Coverage (Radio Resource, March 2003)
- How Kansas City Achieved In-Building Radio Coverage (Radio Resource, March 2003)

## Profession

Principal for Tusa Consulting Services, a radio-consulting firm established in January 1992, specializing in the design and implementation of public safety communication systems. Drawing from a professional career span of 25 years involving virtually every aspect of public and private radio communications (HF-SSB, analog and digital voice FM radio systems, private microwave, multiplex and telephone signaling systems), Tusa has a documented record of successful, high performance radio solutions. Recently, this expertise was put to the ultimate test where three radio networks designed by Tusa were subjected to the force and destructive power of Hurricane Katrina. Katrina proved to be the worst natural disaster to impact the United States and all three Tusa-designed radio networks operated during and after that storm's passage.

## Experience

### Present-1992 *Tusa Consulting Services – Covington, Louisiana* **Principal Consultant**

- Provide private microwave design services to Exxon Company, USA
- Completed 13 public safety radio systems valued at over \$180M
- Provide radio consultant services to private and municipal agencies

### 1985-1992 *Crescent Radio Electronics, Inc.-Metairie, Louisiana* **Co-Owner**

- Start up radio service and product development firm
- Provide contract radio engineering services for Exxon Co. USA
- Design and implement voice radio systems for Chevron
- Developed digital modulators for private carrier for Chevron
- Developed base/repeater station controllers for oil industry use

### 1980-1985 *CSM/EB Communications, Inc. – Lafayette, Louisiana* **Contract Radio Engineer**

- Design/implement HF-SSB Shore Station
  - Develop signaling system for Gulf Oil M/W Network
  - Implement M/W modernization project for Gulf Oil
  - Develop UHF point-to-point radio telephone systems
  - Design/implement helicopter flight-following radio systems
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# Gilbert G. Stock, Jr. MD, ME ChE

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## Key Clients

Hancock County, MS  
Mobile County, AL  
City of Mobile, AL  
MSU, MS  
Mississippi DOC  
Alabama DPS

## Key Qualifications

- 800MHz Reconfiguration
- RF Propagation Modeling
- Interference Investigation

## Education/Training

- 1979-1983: BSE, ChE
- Tulane University, (Magna Cum Laude, with Honors in ChE)
- 1983-1984: ME, ChE
- Tulane University
- 1984-1988: MD
- Tulane School of Medicine
- 1988-1993: Tulane Post Grad
- Residency and Fellowship
- 1990-1991:
- Flight Surgeon, USAF/R

## Professional Memberships

- Society of Broadcast Engineers
- LA State Medical Society

## Registrations/Certifications

- LA Board of Professional Engineers, EIT (T-9309)
- ABIM Internal Medicine 9/92
- ABIM Nephrology 11/94
- LA State Board of Medical Examiners, No. 020089
- MS State Board of Licensure, No. 12916
- Federal Licensing Exam (FLEX) No. 610821003

## Profession

Senior Staff Consultant for Tusa Consulting Services, a radio-consulting firm established in January 1992, specializing in the design and implementation of public safety communication systems.

## Experience

Present -2002 ***Tusa Consulting Service- Covington, Louisiana***  
**Senior Staff Consultant**

- Provide feasibility assessments of emerging VoIP radio technologies
- RF Propagation modeling and network performance verification
- Conceptual design and development of trunked LMR networks
- LMR trunked simulcast network optimization
- Conceptual design of M/W infrastructure networks
- Preparation of life-cycle and initial purchase cost analyses
- FCC license application preparation and filing

1993-2002 ***Private Practice Physician***

- Nephrologist in New Orleans Group Practice (Retired)
- USAF/R Flight Surgeon

1984-1985 ***Research Engineer, USDA***

- Design and develop test apparatus for triglyceride and lipase research

1983-1984 ***Systems Engineer, The Aerospace Corporation***

- Systems Engineer for Strategic Petroleum Reserve Project
- Develop and assess Reliability models for SPR
- Conduct on-site vendor maintenance audits
- Organize and participate in mock "draw-down" SPR drills

1982-1983 ***Operations, Shell Norco Refinery, CUS***

- Equipment Operator, CUS
- Operations of water purification and steam generation systems
- Perform routine maintenance of plant equipment

## Interests and Awards

- Amateur Radio operator and experimenter. Licensed N5UK
  - R/C Aeromodeling
  - Outstanding Senior Resident 1991
  - Owl Club House Staff Honor Role Award 1991
  - Owl Club House Staff Honor Role Award 1990
  - Charity Hospital Outstanding House Staff 1989
-



## Office of the City Manager

29th Floor, City Hall  
414 East 12th Street  
Kansas City, Missouri 64106

(816) 513-1408  
Fax (816) 513-1363

July 26, 2001

The City of Kansas City, Missouri has had the benefit of Mr. Nick Tusa's consulting services for over four years. During that time, the City's 800 MHz simulcast radio system has progressed from one in which coverage and reliability were significant concerns and user confidence was low, to one that has exceptional coverage and reliability and user confidence is high. The City's satisfaction with Mr. Tusa's performance in guiding us to these results is very high, and Mr. Tusa would definitely be hired to assist us again.

Mr. Tusa was hired in the spring of 1997 to assess the City's 800 MHz simulcast radio system. The purpose of the assessment was to 1) verify that the system met the technical specifications contained in the City's IFB and contract with the system's provider, and 2) identify the causes of the coverage and reliability issues that were of concern to our users.

Upon completing that phase, Mr. Tusa's contract was extended to develop a recommended system upgrade that would correct the coverage and reliability issues. A three phase improvement was recommended that included maximizing coverage from existing tower sites, constructing two new radio towers to provide expanded coverage in underserved areas, and expanding the simulcast system's conventional subsystem to provide an even higher level of reliability for fire scene coverage.

The next phase of Mr. Tusa's engagement involved the development of two RFP documents that specified the City's requirements for the three phase upgrade project. Mr. Tusa also participated in the negotiation of the contracts associated with these RFPs, and, worked with the City's technical staff in overseeing and managing the implementation of the contracts and the construction of the upgrades. Mr. Tusa provided every service we needed to successfully complete the upgrade project. As the project's manager, I had total confidence in Mr. Tusa providing solutions, meeting deadlines, expressing his professional opinion, and overcoming the obstacles that arose throughout this project.

If I may provide any further information, you may contact me at (816) 513-1369.

Sincerely,

Richard R. Noll  
Assistant City Manager