



COMMEND WHITEPAPER  
**SMART CITY**

Giving Cities a Voice



There are a number of definitions of what makes a city 'smart'.<sup>12</sup> What they all have in common is, that **Smart Cities** use information and communication technology to improve operational efficiency, share information with the public and provide a better quality of government service and citizen welfare.

Cities are increasingly taking proactive steps to reduce crime rates and crowding<sup>3</sup>, improve traffic congestion, and detect and reduce environmental problems like noise pollution<sup>4</sup>. Audio solutions make it possible to turn these issues into an opportunity and to inform, help, protect and improve the Smart City. The city has a voice - it's time to make it heard!

Cities are preparing for **change** and put in place next-generation systems that work in entirely new ways. There are already a lot of **initiatives** in place to create, deploy and promote **technologically-enabled and sustainable**

**infrastructure**.<sup>5</sup> The primary goal of these initiatives is to use data and technology intelligently to make everyday life easier and better for those who live, work and visit the city - while better understand and control its operations and optimize the use of limited resources.<sup>6</sup>

Public safety, situational awareness and the ability to instantly react and interact in real time play a key role. That is why more and more Smart City initiatives include Intercom and audio technology, to provide **safe and secure communication channels** for all kinds of city services like emergency and danger response, help points, wayfinding, and a variety of audio driven data analysis like noise detection.

This whitepaper will provide information about the incredible possibilities that open up when integrating audio technologies into the city landscape.

## GLOSSARY

**Audio technology:** The use of technology to capture, record, process, and/or reproduce sound. It includes everything from microphones to loudspeakers and sound systems.

**Safety:** The state of being protected from harm or danger.

**Security:** The protection of information and assets from unauthorized access, use, destruction, or manipulation.

**Smart City:** An urban area that uses technology and data to improve quality of life, sustainability, and economic development.

<sup>1</sup> <https://blogs.worldbank.org/sustainablecities/5-views-what-makes-city-smart>

<sup>2</sup> <https://www.twi-global.com/technical-knowledge/faqs/what-is-a-smart-city>

<sup>3</sup> <https://open.lib.umn.edu/socialproblems/chapter/14-3-problems-of-urban-life/>

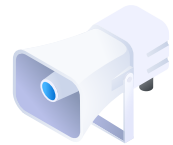
<sup>4</sup> <https://earthclipse.com/environment/major-problems-urbanization.html>

<sup>5</sup> <https://www.ibm.com/downloads/cas/2JYLM4ZA>

<sup>6</sup> <https://www.intelligentcitieschallenge.eu>



## THE POSITIVE RESULTS OF AUDIO & VIDEO PROTECTION



Studies show that **public space protection systems have significantly helped to prevent crime.**<sup>7</sup> While video protection has become an integral part of the city, the integration of **intelligent audio systems aims to make the city even more livable and secure.**

But why is audio relevant when there already is video protection? Well, here is a simple example: In the case of a fire alarm, there unfortunately are always a few people that have no intention of leaving, because they assume that it is just a test. The sound of the siren alone is not enough. But if there were a human voice telling them to get out immediately because there is a fire and ideally tell them which exits to use, everybody would leave as quickly as possible.

This can be easily transferred to public places in cities: Audio integration allows for **validation**. This creates **situational awareness** which leads to **better decision-making**, especially in case of an emergency

Combining audio and video protection systems creates a **better picture of the situation** at all times, which becomes even more relevant in dangerous situations. Furthermore, a **video image alone can be contradictory**. Is a person crying because they need help or are these tears of joy?

With the help of audio solutions, this can be easily **verified**. Another advantage of this combination is the **remote effectiveness** of the authorities, for example through talking cameras. In the case of vandalism, this can be stopped as quickly as possible without the need for a police officer to be on site.

Much more flexible and less costly than hiring additional security personnel, the deployment of such a protection system offers all the possibilities in terms of public space networking. Active and effective 24 hours a day, seven days a week, it is **reassuring for all inhabitants** and visitors of the city.

For example, our Case Study about the City of Calgary (CA) showed that the vast network of equipment in the 1.2 million people city can be maintained and managed by a team of three people. This demonstrates the improved operational efficiency these integrated systems bring with them.

It might be for one of these reasons that the city of Nice wanted to have 175 emergency call stations in an attempt to become the most secure city in France.

<sup>7</sup> <https://onlinelibrary.wiley.com/doi/abs/10.1111/1745-9133.12419>

# USE CASES

The use of audio technology in city life can have a wide range of benefits, such as **enhancing communication, improving decision-making** and **increasing responsiveness**. An intercom system is a powerful tool, which facilitates two-way communication between city users and the control room. Commend has been a leader in this field for many years and is dedicated to providing comprehensive solutions and expertise to city governments. With an **intercom system**, citizens can send requests to the control centre and receive timely responses. In addition, emergency situations can be addressed quickly and effectively, as the intercom system allows for the validation of information through direct engagement with people in the city. With these solutions in place, cities can ensure **efficient and effective operations**.



## INFORMATION BOARDS

Foreigners often struggle to get around in unknown cities. Placing **info boards** near transit points & landmarks could help them explore the city easily. These systems could be expanded with Commend's Ivy, the world's first **Conversational AI**-based Intercom voice assistant, which could provide translations and answers to common questions. These info boards can make information exchange **more inclusive** and accessible for people with disabilities.

## CHARGING STATIONS

Electric charging stations and **self-service stations** in general are becoming a more and more important part of the Smart City. But what if something is unclear? Intercom creates a fast connection to customer service which in the end will account for **satisfied customers**.



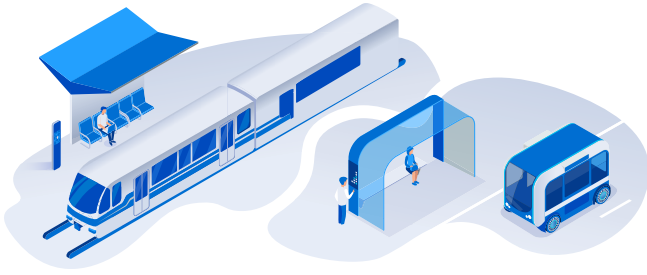
## ROAD ACCESS

**Automated on-street access management**, for example with bollards such as in Bern (CH), will facilitate smooth, controlled access for residents, shop tenants and public traffic while protecting pedestrians.

## PARKING OPERATIONS

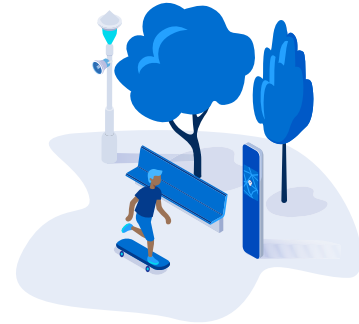
Car parking facilities can be public or private, ranging from building basements to shopping malls. In order to ensure **efficient operations**, generate revenue and prioritize security and safety, these facilities must be equipped with high-quality and reliable communications between a Control Room and the parking customers. This communication system should be integrated with a comprehensive video surveillance system and integrated access control to **provide real-time information** about the number of people entering and exiting the facility, and to monitor suspicious activity.





## COMMUTER SUPPORT

Millions of people rely on public transportation each day to get where they need to go **safely and quickly**. In the event of an emergency, they need to be able to reach someone in charge and get assistance - immediately and from any location. That's why it's essential for **train, bus, tram, and cable car** operators to provide reliable, round-the-clock support for their passengers, ensuring their well-being no matter where their journey takes them.



## SMART SPEAKERS

Audio systems can improve video monitoring performance, **transmit messages** like weather warnings, and broadcast music to outdoor viewers. Smart speakers, with IP-based technology can autonomously **adapt to the surrounding sounds** and this way offer more flexibility & scalability. Furthermore, they can be easily integrated with other solutions,



## SMART STREET LIGHTS

**Smart street lights** can greatly enhance the sense of safety and security in urban environments, especially at night time. Not only do they provide **illumination**, but they can also be equipped with **emergency call stations** connected to an emergency response network. This means that help is always just a button press away in case of an emergency, helping to make people feel safer and more secure in their communities.

## TALKING CAMERAS

Often the camera view is not enough and here IP speakers enable direct communication with those affected on site. They allow, for example, **interrupting a potential crime** by directly addressing the person committing it.

## AND MANY MORE...





## AUDIO SOLUTIONS: IMPROVING THE SMART CITY EXPERIENCE

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Audio terminals by Commend, perfectly integrated into the urban environment, are designed to inform the population, help them find their way around, protect them and improve their overall stay in the **Smart City**.

If urban areas have an increasingly dense network of cameras, the agents of the urban supervision centres who watch over the safety of city users need to be alerted in the case of emergencies. Screams and sirens can be used as effective warning systems, but for example victims of domestic violence cannot just call the police via phone but need access to an emergency call button that can be activated from any location. This will not only provide them with a direct link to emergency services, but also increase the security of all city users.

Thereby, **the Smart City must be accessible to all**. A sufficient number of interactive terminals must enable all

passers-by to report any kind of problem or malfunction (for example a fallen tree) in real time to the corresponding authorities. Instantaneousness and reactivity is the heart and soul of a smart and modern city.

Nowadays, when nearly every person owns a **smartphone**, some might wonder why for example an emergency call station is even relevant. It is the **dedicated networks** that make it so special: In case of an emergency, there is no lost time while explaining to the person on the other end where the hot spot is. Neither will there be complications for the receiver of the emergency call, because it will go directly to the **responsible** specialist.

Therefore, it is extremely important to consider the topic of call attendance for control rooms. To guarantee that all calls are answered as fast as possible, dynamic call management is the way to go.

## DYNAMIC CALL MANAGEMENT

To ensure that these audio solutions truly inform, help, and protect city users, there are **no waiting times for callers** in Smart Cities and they are always connected to the right contact person - around the clock and also on weekends. For the operators and those who take calls, the effort is as low as possible and they receive valuable support from the system in order to be able to **process all calls rapidly**. Find more information on how this works so easily in the info box.



### INFOBOX: WHAT IS CALL ROUTING?

- Distinction between standard calls and emergency calls
- Prioritisation of emergency calls - targets can be police/emergency services/security control centers
- Depending on the time and day of the week, the calls can be forwarded to different call destinations - e.g. emergency calls at night to a central control center, information calls on the weekend to a smartphone
- Calls can be forwarded to several call destinations at the same time
- If a call is not answered after a defined period of time, it is forwarded to the next call destination (ward/mobile)
- Chaining of several logics

## UNITING ALL INTERESTS ON ONE PLATFORM

Many stakeholders are involved in the decision process for Smart Cities. Thereby, for example, the office of tourism has of course different interests than mobility operators like mass transit or parking agencies. Equally, the police or a safety agency needs a different solution than an energy savings committee. But wouldn't it be better to align all of those interests on one platform?

Therefore, it would be wise to look for a Smart City solution that can bring all of the stakeholders together. Unified platforms can simplify coordination and collaboration between the public and private sectors, providing a comprehensive overview of the overall Smart City plan, rather than relying on separate systems for each department. This not only increases efficiency and cost-effectiveness but also ensures that everyone is working towards the same goal - a secure, livable Smart City.

# AUDIO MANAGEMENT

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The city is noisy, no one can deny it. According to the World Health Organization (WHO), noise levels above 53 decibels have harmful effects. **Regular exposure to such noise levels has a direct impact on the physical and mental health.** It can lead to significant behavioral problems caused by sleep disorders. Thus, noise increases the risk of ischemic heart disease as well as for mental disorders.<sup>8</sup>

However, noise pollution has not only a direct impact on the individual's state of health, but also on the **image and perception of the city** as a whole. Guided by Europe, but also by the WHO, many cities are therefore trying to implement "Noise Management". One aspect of it is the measuring of audio levels.



## AUDIO MEASUREMENT

While some sources of noise nuisances seem to be inevitable, it is advisable, first of all, to rigorously **map all these sources of noise**, to collect and later analyze this data, and act accordingly in order to preserve the quiet for the residents of these noisy zones.

For such noise surveys, **Commend provides devices able to collect, quantify and analyze these acoustic data.** Rendered in the form of graphs, these data offer a fine analysis of the volume of decibels recorded in real time. This type of device developed by Commend can be directly integrated into street furniture or existing video protection systems.

The data, transmitted at regular intervals, can be the subject of specific alerts in case of abnormal volume exceedance and even generate instantaneous images of the sector concerned. In regular analysis or in case of alarm, only the decibel fluctuations are registered, leaving the operator **in line with the GDPR.**

## AUDIO RECOGNITION

Thanks to the development of artificial intelligence, the analysis of city sounds is becoming increasingly refined. These new generation systems are able to **distinguish suspect noises such as gunshots** or explosions in the middle of the city soundscape or even to avoid graffiti in a historic area through the audio recognition of a clacking spray can. It is these specific noises that **trigger alerts** to the police or the Urban Supervision Center. Of course, all of these solutions must be in compliance with GDPR.

The control officers cannot hear these noises, nor the conversations, but they receive these **alerts in real time.** In addition to these alerts, the devices allow to locate with precision the place where these suspicious noises come from. Thus, the law enforcement or emergency services can **intervene more quickly** and, above all, provide an appropriate response.

The audio solutions are very helpful for **Estimate of Adversary Sequence Interruption.** For example, in case of vandalism, the police can directly talk to the suspect via loudspeaker and thereby hinder them from continuing their actions by letting them know they will be there soon.

<sup>8</sup> <https://www.who.int/publications/i/item/9789289053563>

## AUDIO DETECTION: A PUBLIC SAFETY ISSUE

Nowadays, very often placed on top of streetlights, video protection systems help to **secure pedestrian traffic** in the city. In addition to installations for real-time recording of images, street lamps can also be equipped with **emergency call devices directly connected to rescue centers, loudspeakers, sirens, etc.**

In order to bring back tranquility to sensitive areas, the mere presence of cameras is not enough. Users must be able to be heard in case of nuisance and an adapted and almost instantaneous response must be provided.

In Nice, for example, where the municipality has chosen to equip the city with emergency call stations, especially in the immediate vicinity of schools, the result is clear: **The sixteen emergency call points placed in strategic locations have been activated more than six hundred times in one year.** Calls were issued among others in the context of domestic violence, theft, or loss of children. The audio devices allowed for quick and efficient actions. In order to make the public sphere even safer, the City of Nice has decided to use similar emergency audio installations in front of each of its ninety-five schools in the future.

Moreover, placing these terminals in the public space also allows for **additional help in the event of an accident.** The emergency services intervene more quickly and while waiting, the witnesses can be guided by both the emergency medical assistance and the police to bridge waiting times or establish a temporary traffic flow.

## DOUBTS ABOUT AUDIO & VIDEO PROTECTION

When talking about the surveillance of public spaces, too many people still confuse **surveillance** systems with **protection** systems. Critics argue that there is a risk of security data abuse and excessive surveillance of our movements. However, in January 2020, the European Data Protection Board issued a directive on video surveillance that prohibits using facial recognition to identify individuals without their consent.\* And to prevent arbitrary video surveillance for the sole reason of data generation, EU institutions must provide a **public policy** stating what is surveilled and why.

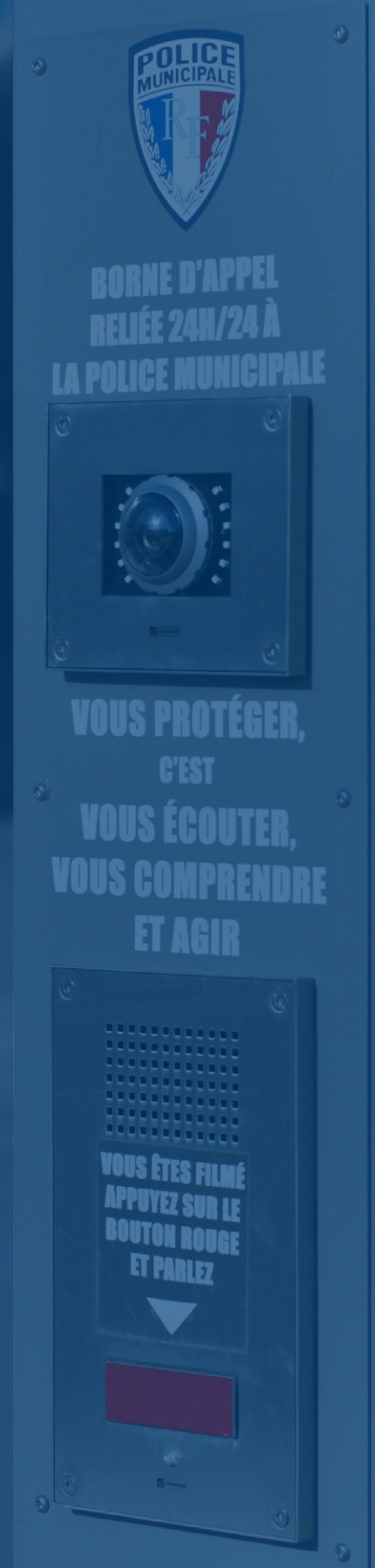
Video surveillance is reserved for private spaces. These systems aim to monitor, with the help of cameras, private places against the risks of theft or intrusion. Public spaces and places open to the public are placed under video protection. These visual monitoring systems aim to **guarantee the safe movement of people and goods.**

And concerning audio surveillance: **It is not allowed to continuously listen to conversations or to pinpoint an identity!** But the operator can set a decibel threshold and if the volume exceeds this, caused for example by a fight going on at a public place, then for the safety of the people it is allowed to listen in and act accordingly.

Of course, not everybody has access to this data - only the authorities. In other words: the right tool in the hands of the right people does not pose a risk of data misuse. For that matter, it is also very important to ensure that these solutions are **cyber secure** in order to protect the systems, and more importantly the data, from unauthorized access.

It is important to know that these Smart City solutions are not installed with the sole interest to collect data. Instead, they help the authorities **intervene when necessary** to guarantee the safe movement of people and goods around a city.

\* There are different regulations for each country. Please check what applies to you.



## DO NOT IGNORE CYBER THREATS

Data needs to be protected against unauthorized access in the best possible way in order to ensure the availability of products and services. **Cyber Security** should therefore be a top priority to protect and secure customer data. Commend solutions are cyber secure, following the principle of 'Privacy and Security by Design'. This ensures safe application and availability in the public domain and gives the authorities piece of mind that cyber abuse will be detected and prevented at all times. Commend provides comprehensive vulnerability management solutions to keep deployed systems secure and up-to-date, including publishing of vulnerabilities, provision of patches, and upgrade assurances.



## AGILE AND SCALABLE MULTI-USE SOLUTIONS

Our audio solutions do not only provide clear communication in the case of an incident but can also be **used for operational communications**. Commend offers single source solutions for various use cases. This **multifunctionality** becomes relevant with regard to the initial acquisition costs.

For example, **Ivy**, the world's first **Conversational AI**-based Intercom voice assistant by Commend answers everyday questions, common queries and stops empty calls to limit valuable attendance time by use of **Artificial Intelligence**. This reduces the workload for customer services, or in the case of Smart Cities: Tourist information points. Ivy gives an instant response and will find out the customer needs. Then, any need that can be automatically answered will be taken care of by Ivy - other calls will be forwarded to a human attendant.

An agile city such as the Smart City must provide **inclusive** and intelligent support services to meet the informational needs of all people. Touchscreen kiosks make **information exchange** interactive, quickly delivering connection info, rental services, and city maps with a simple touch or voice control. Live subtitles can even be provided for people with hearing impairments. Already deployed in many train stations and airports, such installations aim to **improve user comfort, empower and reassure passengers** about schedules, destinations and applicable fare conditions.

## INTERFACES AND INTEGRATIONS

To guarantee that a new solution is future-proof and will definitely pay off, it is important to ensure that it will blend in with anything that is already existing. In security and communication systems, it is essential that **different systems work together**. Constantly exchanging data, video and audio streams, these systems must utilise their full potential in well-coordinated interplay to provide perfectly integrated solutions for operators and users.

A system should provide all the flexibility that is needed. Commend systems can communicate in many common standard protocols to guarantee seamless interoperability which will lead to a seamless solution for your Smart City. By connecting different systems through interfaces or standards, we create workflows to **increase efficiency** and to **improve the safety of people**. After all, it is the city users whom the solution is for in order to ease their way around the city.



## THINGS TO CONSIDER

Imagine you are standing at a square in the middle of your city. Close your eyes and take in the sounds of the city. Allow yourself to be immersed in the hustle and bustle of life, the conversations and the laughter. By listening to the sound of a city, you can gain insights that a video image will never be able to provide. Do these sounds offer supportive information to complete the picture?

1. Open your eyes and take a look around the city. How many different types of information, signage, devices and independent systems can you see? Can you imagine how much the city's landscape could benefit from the integration of these individual applications?
2. Look even more closely: Are there surveillance cameras nearby? If a camera is able to detect an event, what measures can be taken to immediately respond to it? Alternatively, will the camera only be utilized to review footage hours after the occurrence of an event?
3. Humans have eyes, ears, mouths, and hands to communicate in a variety of situations. To see, listen, speak and write. So why is it that most safety and security applications still lack three out of the four available methods of communication?
4. Moving around in a city without a car or phone can make finding tourist information, mobility options, language assistance, and emergency services tricky. However, there are resources available to make navigating these challenges easier.

## WHY COMMEND?

### SYSTEM AVAILABILITY

Commend systems offer the highest availability. Automated self-monitoring eliminates the need for manual function testing.

### NETWORKING OF SITES

Devices and sites are easily setup and managed. Smart signal routing ensures users get relevant info based on needs, priorities and access level.



### EVERGREEN PHILOSOPHY

Long-lasting products, long-lasting customer relations, long-lasting technology.

### SPEECH INTELLIGIBILITY

Commend solutions are designed and tested to ensure crystal clear communication under any circumstance.

## CONCLUSION

Municipalities can take advantage of new technological possibilities to effectively improve the quality of life in cities. By incorporating audio technology into cities, we can re-evaluate existing processes to address the issues cities face, resulting in a more efficient, safe, and inclusive environment. With a comprehensive, long-term platform solution, municipalities can optimize their safety, security and support operations across multiple departments.

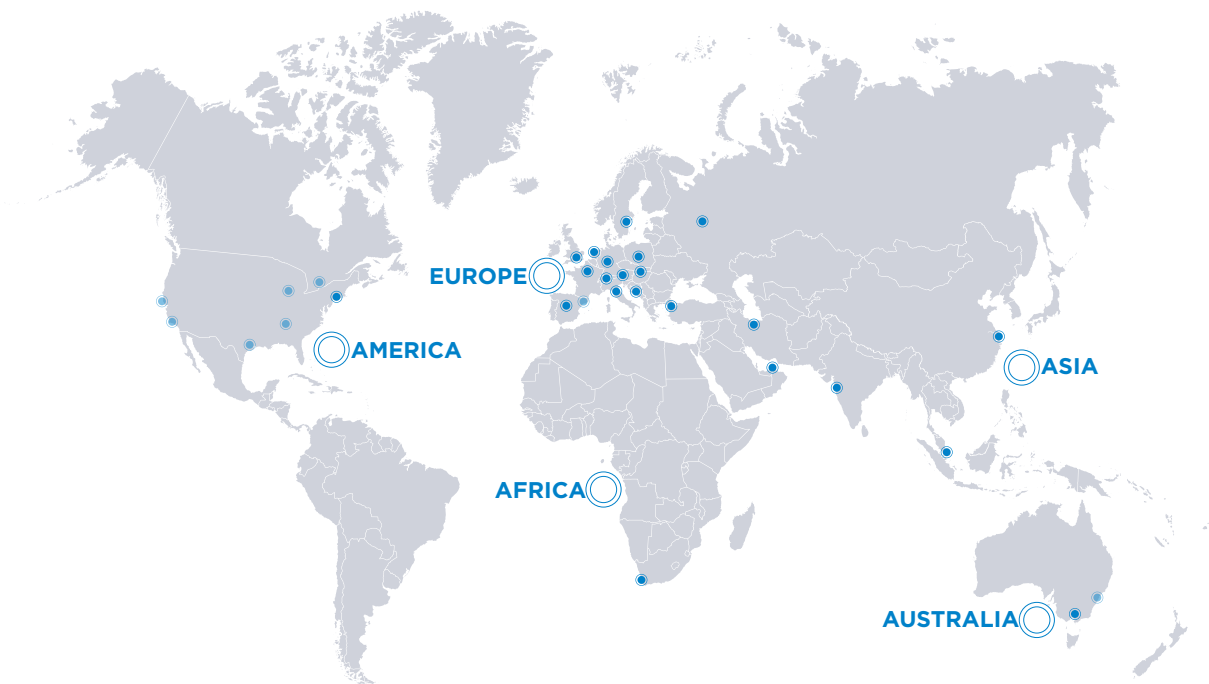
These solutions can help to ...

- create all-in one support units and city-wide solutions that seamlessly integrate with the urban environment.
- gain a deeper understanding of the city's state of operations.
- increase the level of safety in a city, especially in combination with existing video surveillance systems or in the form of emergency call stations.
- increase efficiency and accessibility by providing tailored customer support automation for tourist information, mobility information and incident response on demand.
- collect and align information for various stakeholders, and when desired, exchange the information between various city departments.



## COMMEND WORLDWIDE

23 sales organisations, operating in more than 60 Countries.  
More than 550 employees worldwide.



## SECURE COMMUNICATION SYSTEMS BY COMMEND

Can you imagine a system that millions of people rely on every day, where every word has to count? That's the world of Commend! Secure, reliable communication is our passion. We are a global market leader with more than 45 years' experience in speech transmission. In addition to Intercom and video connections that interface with third-party systems we also provide products that open up new possibilities for integrated solutions. Commend is the first choice worldwide when it comes to secure and professional communication systems.



Quality-tested. Reliable. Well-designed. COMMEND products are developed and manufactured by Commend International in Salzburg, Austria. Our development and manufacturing processes are certified as per EN ISO 9001:2015 and per IEC ISO 27001.

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Smart Cities at Commend?  
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[www.commend.com](http://www.commend.com)

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*Reference links in this document are as of February 2023 and may be subject to change.*