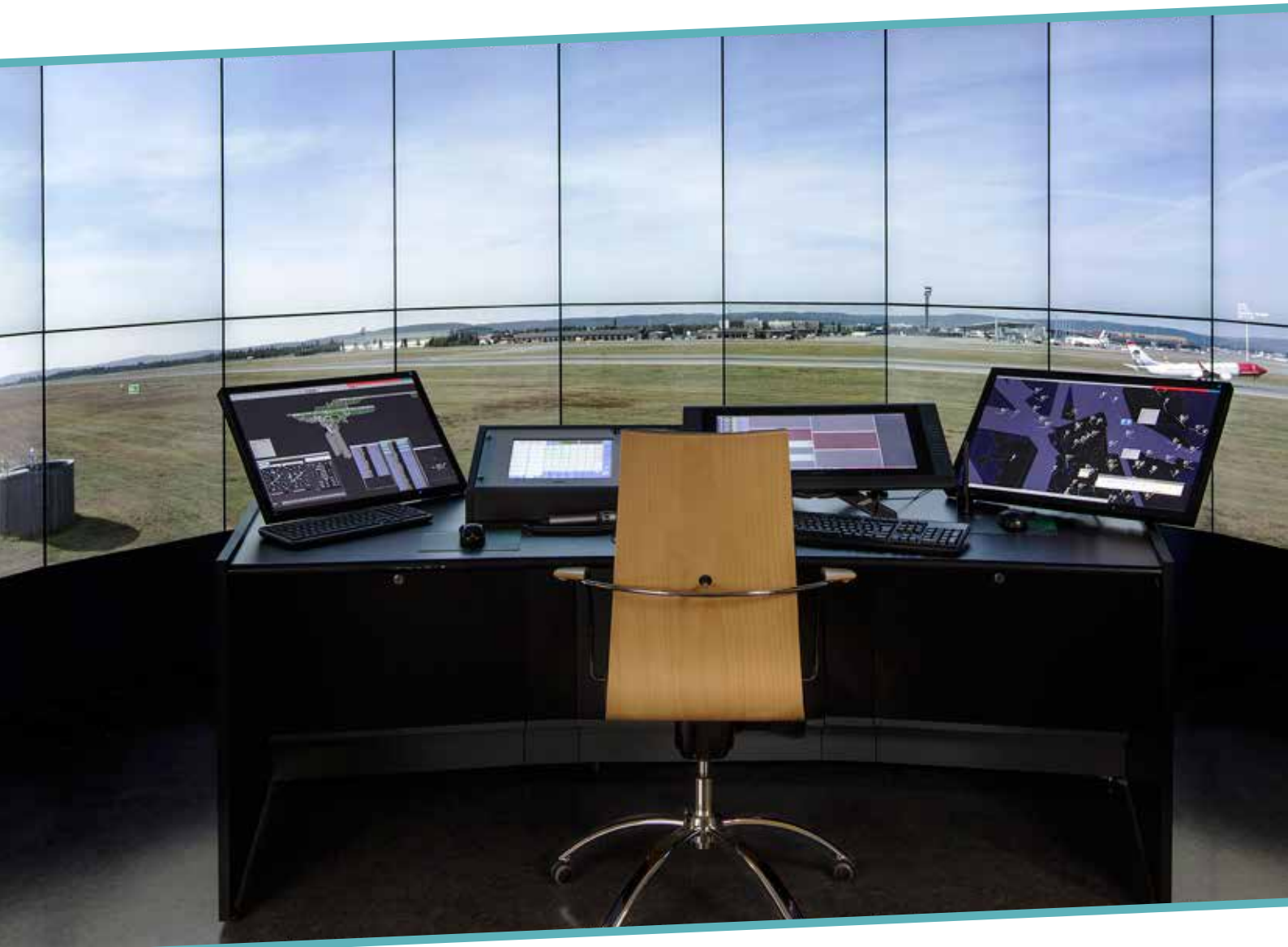


# ninox

Remote Towers

[www.ninoxrt.com](http://www.ninoxrt.com)



# NINOX REMOTE TOWER SOLUTION

NINOX is a partnership between Avinor, Indra Navia and Kongsberg Defence & Aerospace AS (KDA).

Avinor provides airport control and approach control services at airports; provides air traffic services in the Norwegian airspace; and operates the technical infrastructure for air navigation. Avinor offers consulting and advisory services in large and complex airspace changes, major construction planning at airports, and the replacement or deployment of new systems.

Avinor also provides implementation of training programs and safety evaluations associated with airspace changes and the construction of new airport infrastructure.

Indra Navia AS is a leading Air Traffic Management system provider; internationally renowned for designing, producing, integrating and supporting airport communication, navigation and tower systems. The company's customized solutions deliver outstanding long-term value under the most demanding conditions. More than 1300 airports rely on their products; the GAREX, NORMARC and InNOVA. The InNOVA AIR Tower System, Strips and Safety Nets, as well as the GAREX 230 VCS, are provided in NINOX.

KONGSBERG is an international high technology powerhouse – providing solutions ranging from the deep ocean to outer space. KONGSBERG provides robust and leading-edge electro-optical sensor technology as part of the NINOX system – technology that is a direct spin-off from the world's most advance military sensor technology.

KONGSBERG also contributes with real-time network technology that provides a true, open Service-Oriented Architecture (SOA) and inherent safety logic, to guarantee safe and flexible RTS operations.



**indra** navia



KONGSBERG



# REMOTE TOWERS



The NINOX Remote Tower System (RTS) is the solution for all future remote tower related operations; virtual, contingency and remotely controlled towers.

NINOX is a new Remote Tower System that has been designed and engineered from the top down to provide exceptional performance; drawing on decades of operational excellence and research in cutting-edge camera technologies, real-time systems with high network security based on open international DDS standard, and sensor technologies.

Avinor's NINOX program is the world's largest RTS program. More than 36 sites in Norway have been designated for Remote Tower Systems, starting implementing 15 airports in one control center.



# REMOTE TOWERS

## EXTREME PERFORMANCE

The NINOX PTP camera system was adapted from KONGSBERG technology developed for use by the US Army in remote weapons systems and battlefield sensor pods. The result is a camera that provides unparalleled acuity and sensitivity, in a package rugged enough to meet the demands of the battlefield.

The NINOX PTP system provides sensors including a Pan/Tilt/Zoom camera, laser rangefinder, and night vision systems. The resulting integrated display gives controllers an exceptionally clear picture of airport operations: aircraft markings and landing gear are clearly visible – even in low light and bad weather conditions.

The performance and visual acuity of the NINOX 360 camera are equivalent to 20/20 vision. Camera's resolution is 0.28 mrad meaning that an object which is 28 cm in size is visible for the operator when it is at a range of 1 km from the camera sensor.

The unique NINOX EOSS (Electro Optical Sensor Suite) is immune to the destructive effects of "camera burn-in" caused by long-term exposure to direct sunlight, and is unaffected by rain, snow or grime on the camera's outer surface.

The unique seamless integration of Indra Navia's advanced InNOVA ATM system for ATC Tower operations gives the system the full ATM capability necessary to scale up in the range from smaller up to large, world class airports.

The NINOX Remote Tower System is scalable and is capable of operating at least 15 airports from a single control center; and rugged and reliable enough to be capable to operate for years in the extreme conditions of the remote northern reaches of Norway.



# REMOTE TOWERS

## ADAPTABLE AND EASILY INTEGRATED

The NINOX system provides air traffic controllers with a fully integrated controller's workstation. The work station provides a complete situational awareness display for both air and ground traffic together with other relevant information through the Head Down Display (HDD). The HDD can be displayed and configured according to user preferences.

The NINOX HDD is a unique seamless integration of Indra Navia's InNOVA ATM systems for air traffic control. The NINOX HDD includes the integration and control of airport lighting, airport environmental conditions, electronic flight strips tailored to the end user requirements, airport and terminal sensors and radars.

The heads-down displays, flight strips, communication systems, and other components can easily be integrated with existing airport systems. Our approach is to tailor the user interfaces and work with local suppliers to ensure full compatibility with systems already in place.

To ensure a well-structured and loosely-coupled architecture allowing for future development, the RTS software is designed based on Service Oriented Architecture (SOA) with the open international Data Distribution Service (DDS) standard from the Object Management Group (OMG). DDS is specifically designed for use in mission critical real-time systems such as the RTS. This includes the integration of new systems within RTS and also an integration of systems external to RTS.

SOA and DDS are keywords in the future ATM Interoperability Infrastructure SWIM (System Wide Information Management).

### SURVEILLANCE & SENSORS



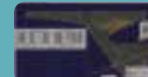
### COMMUNICATION



### ATC MONITORING & CONTROL



### GUIDANCE & INFORMATION





# REMOTE TOWERS



*NINOX HUD/HDD*



*NINOX PTP*



*NINOX EOSS (NINOX PTP and NINOX 360)*

# REMOTE TOWERS

## InNOVA AIR Tower Systems



### AUTOMATED

Automation plays a key role in the Indra Navia's InNOVA AIR concept. It reaches new heights of sophistication at larger airports, requiring improved throughput and with solutions based on airport surveillance and control, Arrival, departure and ground management and flight data processing. These are central areas to the InNOVA concept being driven by developments within SESAR (Single European Sky ATM Research).

### INTEGRATED

Traditionally, airport towers have used a wide range of different products, such as meteorological information, communications systems, radar systems, runway lighting, etc. The NINOX system integrates these into one solution.

### InNOVA IS TAILORED FOR REMOTE TOWERS

The high integrity, fusion and automation, matured through years of operation at large airports, and the integration of displays, sensors and information makes InNOVA the ideal platform for the merging remote tower platforms – for the virtual, contingency or remotely controlled airports.

### FLEXIBLE, ADAPTABLE SOLUTIONS

The InNOVA system is a flexible, user-oriented solution. It is hardware-independent, and is mature, with the basic system being operational at the world's most important airport towers for more than 25 years.

### INTUITIVE, USER-FRIENDLY HMI

The HMI has been deployed worldwide in close co-operation with controllers and users, so there is already a high level of configurability and user-friendliness.

# REMOTE TOWERS

## IMPLEMENTING REMOTE TOWER SOLUTIONS

The excellent expertise within the NINOX Team consisting of Avinor, Indra Navia and KDA covers the whole process of implementing a Remote Tower System.

Through the experience with the Remote Tower Program in Norway, Avinor ANS can facilitate the processes from program inception to an operational Remote Tower unit. This involves development of operational concepts, safety and human performance assessments, technical and operational system requirements and design solutions for both airports and a Remote Tower center. Training packages and local operational procedures are available, adding value to any Remote Tower implementation program. By use of the joint expertise and experience, the NINOX Team can help the customers to reduce risk, cost and time when implementing Remote Towers.

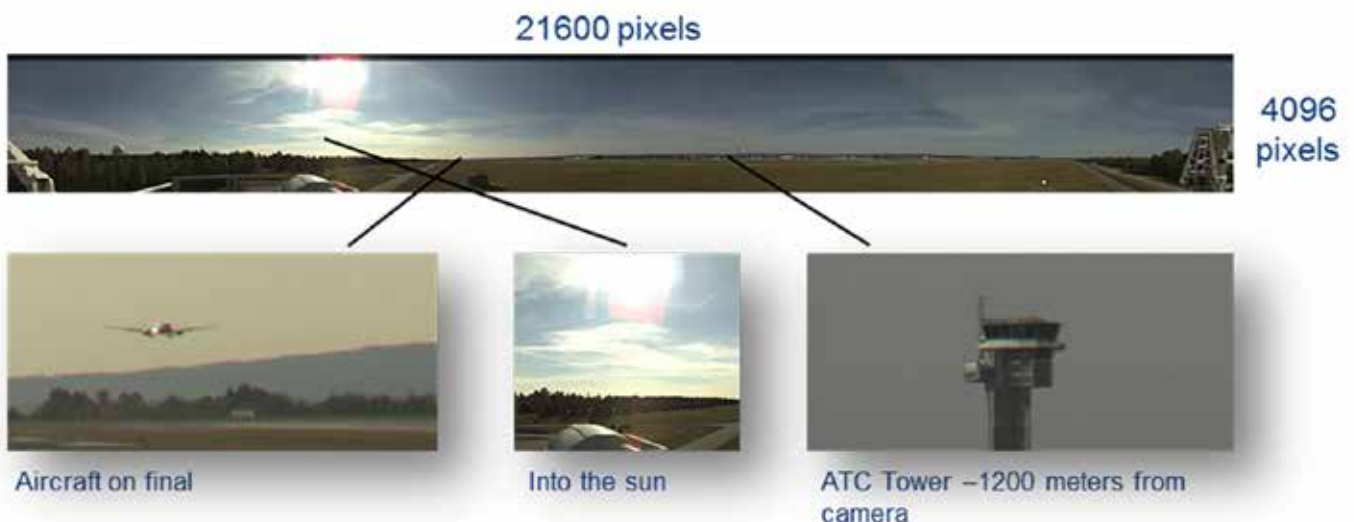




# REMOTE TOWERS

## FEATURES

- Maintains visual acuity of 20:20, similar to human eye
- Range-resolution: eye resolution – 0.28mrad/28cm at 1 km
- Scalable: lower bandwidth requirements to support long distance transmission, multiple sites, AT system adaptable to both small and large, complex airports
- Completely seamless field of view, horizontal 360° and vertical 60°
- Based on sensor technology developed for the US Department of Defence
- High visibility in bad weather or direct sun
- PTZ with a binocular view, visual and infrared light
- Highest vertical field of view so controllers see more sky
- Tracking capabilities
- High situational awareness
- Low airport footprint – camera and equipment infrastructure
- Lowest maintenance cost and best total cost of ownership (TCO)
- Prepared for operation of multiple airport – simultaneously
- State of the art electronic flight strip system
- Safety nets for air and ground available
- Integrated tower display system providing access to all tower functions through a single, user-friendly workspace
- Designed to function in extreme environments with extreme reliability and ruggedness
- Service-oriented architecture (SOA) with open international DDS standard gives a well-structured and loosely-coupled architecture allowing for future enhancements and development



# REMOTE TOWERS

## THE CASE FOR REMOTE TOWERS

Remote Tower System (RTS) is gaining momentum around the world as aviation authorities begin to analyze the business case benefits and safety case which may be realized in previously uncontrolled airports or at small/medium sized controlled airports.

Remote Tower Systems provide a cost-effective way to introduce services to many airports which today are growing, attracting commercial services, and provide financial benefits to local communities. When compared to the cost of a traditional tower construction, and overall operational lifecycle costs of operating the tower, a RTS becomes a clear choice in providing ATC services to small and medium facilities.

Remote Tower Systems can provide a substantial reduction in total cost of ownership, giving operators greater flexibility in achieving the end goal of providing Air Traffic Services.

The case for RTS is also being made at some of the busiest airports in the world with large airports having grown extensively in the last 20 years. The location of the tower at these airports has meant that in some cases, “blind spots” or areas of poor visibility have developed where construction of new airside facilities or new runways has taken place.

Remote Tower Systems can be used as an effective way of providing visual confirmation in hard to see locations – providing an increased level of safety for airport operations.

Recently, the discussion for RTS as a viable “contingency” strategy for major airports has surfaced. In the event of outages and or major failures, remote operations located a distance away from the airport would allow the service provider to continue airport operations. Remote Tower Systems show potential in improving the efficiency and safety of operations at airports.



# REMOTE TOWERS

## THE NINOX OWL

“Ninox” is a genus of owls, known for focus, concentration, wisdom, and an acute sense of sight – with the ability to see 360 degrees. The owl is a watchman with extraordinary vision during the day and in the darkest of nights, allowing it to absorb and process the information to make the right decisions.

NINOX - maintains and meets all operational requirements and human factor aspects by adding all available ATM functionality and data to the visual reproduction.

NINOX - enables a presentation of the tower in “eye resolution”, at a bandwidth achievable anywhere.

NINOX - maintains and improves situational awareness and system safety of any remote airport.

NINOX - secures compliancy with all relevant ICAO requirements.

NINOX - the optimal tool for any ANSP with the objectives of reducing cost and improving efficiency and safety.

# ninox

Remote Towers

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## QUESTIONS ABOUT REMOTE TOWERS?



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