

Information Letter about Forest Monitoring System "Lesnoy Dozor"

ABOUT US

We are a scientific production association "Distant Systems Control" (hereinafter – "DSC") — the residents of Skolkovo Innovation Center. We have developed and sell innovative forest monitoring system "**Lesnoy Dozor**" (Forest Watch). The system is implemented/ was successfully tested in 11 Russian and 1 Byelorussian regions:

- 1. Nyzhniy Novgorod Region.
- 2. Tver Region.
- 3. Respublika Komi.
- 4. Amur Region.
- 5. Respublika Mariy El.
- 6. Moscow Region.
- 7. Vologda Region.
- 8. Kursk Region.
- 9. Kemerovo Region.
- 10. Tambov Region
- 11. Kaliningrad Region.
- 12. Homyel' Region (Byelorussia).

We have positive references from our customers and President Medvedev's official support. Today negotiations are also hold with Ukraine, Belarus, Kazakhstan and dozens of Russian regions.

SYSTEM «LESNOY DOZOR»

Today the main product of our team is **"Lesnoy Dozor"** - an <u>early</u> warning system for forest fires which is also good at plotting fires' coordinates. For this purpose any towers, modern equipment and own software are used. All this helps "Lesnoy Dozor" to find forest fires on large and small areas efficiently.

The system consists of 2 main parts:

- 1. hardware;
- 2. software.

The hardware part is special surveillance equipment (video cameras, thermal imagers, infrared cameras, etc.), that are installed on various towers. These sensors observe the adjacent zone and transmit the video to control centers at once.

The software part is a special software, that is installed on the control center operator's PC. It guarantees high efficiency of forest fires detection and plotting fires' coordinates. It is integrated with current IT technologies: computer vision, geoinformation system technologies, IP video surveillance and client-server applications

The systems characteristics depend on three factors:

- the surveillance equipment (sensors);
- the scheme of the system (communication buses, sensors suspension height);
- weather, terrestrial and other conditions.

If you create perfect working conditions, the system features will be as follows.

Coverage range detection	within 30 km
Direction detection accuracy	0,5 degree
Detection accuracy	+/- 250 m
Time to alert	approx. 10 minutes
Number of sensors that could be controlled by one operator	up to15 (up to 50 in the long term)
Number of system controlled surveillance points	without limit

In order to work out systems technical characteristics in some particular region we need relevant maps (or appropriate coordinates) with marks and notes, that point out what forest areas should be surveilled. As soon as you send us this data, we'll run a system simulation program to calculate the price and "Lesnoy Dozor" technical characteristics.

The cost of the system in various areas is different as different suitable equipment is needed. For instance video cameras cost range from 2000 to 5000 euros, infrared imagers – up to 38000 and communication buses – from 50 to 1300 euros (a month). How much a customer will spend on the system in general, practically depends on those, what kind of equipment is good for this or that location.

The system is controlled by "Lesnoy Dozor" software. Actually it is the brain of the system. Dangerous objects (smoke, fire) are detected by the software automatically. As for the final decision, it is made by the control center operator.

"Lesnoy Dozor" software carries out following functions:

- 1. enabling operations with *different* types of sensors (video cameras, infrared imagers, infrared cameras, etc.);
- 2. control center operator assistance to detect forest fires in a real-time mode;
- 3. forest fires detection in an *automatic* mode;



- 4. opportunity to connect with some *other* information systems;
- 5. opportunity to *adapt* the system to certain conditions and customer's demands;
- 6. opportunity to effect the *direction detection* immediately and (sometimes) plot out the right coordinates;



- 7. opportunity to plot out the forest fires coordinates from just *one* tower;
- 8. opportunity to control the operator's decisions;



9. opportunity to estimate forest fires size;



10. opportunity to control a great deal of watch towers with the help of *one* man.



- "Lesnoy Dozor" software interface

OUR SERVICE

We render the following services:

cellular communication infrastructure adaptation;



appropriate surveillance equipment selection;



- technical document preparation (wiring diagrams, installation-specific settings, etc.);
- installation, balancing and commissioning (on our own or by means of our partner to reduce customer's expenses. Now we are looking for such partner in Europe;



"Lesnoy Dozor "software service and upgrade;



- we are also ready to improve our software in order to meet customer's requirements. For example, to integrate it with a set of other information systems for the purpose of:
 - forest monitoring (satellite, terrestrial, aircraft);
 - forest inventory;
 - forest fires warning;
 - forest fires forecasting;
 - forest fires extension modelling.



In order to implement system "Lesnoy Dozor" in any region some stages should be passed anyway:

- 1. system requirements formulation.
- 2. watch towers/celluar towers selection.
- 3. appropriate equipment selection.
- 4. equipment delivery and installation.
- 5. equipment setting.
- 6. software installation and running.

PARTNERS

We are looking forward for any cooperation and ready to share experience with our European partners.

• Public Company <u>Tele2</u>, Tver Branch.

- FSUE Russian Television and Radio Broadcasting Network (RTRS).
- JSC Rostelecom.
- JSC Mobile TeleSystems (<u>MTS</u>).
- JSC MegaFon, Central Branch.
- CC <u>NCC</u>.
- Nizhegorodskiy Innovation Business-Incubator (<u>NIBI</u>).
- Axis Communications AB.
- LLC <u>SB Legion</u>.
- JSC The Central Research Institute Cyclone.
- JSC Research Institute Rastr.
- <u>ScanEx</u> Research and Development Center.
- Federal Goverment Agency Avialesoohrana.
- LLC INKOM.
- Skolkovo Innovation Centre.
- WWF Russia, Amur branch.

Truly yours, Director of "DSC"

_____/I.S. Shishalov



Forest Monitoring Methods

- Satellite.
- Aircraft.
- Terrestrial.









Terrestrial Monitoring

- Surveillance from watch towers (the most suitable surveillance height).
 - 24 hours a day surveillance.
 - Close to forest areas.



Terrestrial Monitoring Systems Surveillance

Observer

TV camera unit

Distributed system

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Preconditions of

Engineering Development Systems Construction

- The number of cell towers has grown up rapidly, which means that their coverage area has increased.
- Digital technology (DT) costs have decreased. At the same time DT is used almost everywhere.
- Shortage of manpower and manpower costs have raised.
- Surveillance equipment has decreased (camcorders, infrared cameras, infrared imagers, etc.). Moreover, technical features have been improved.
- Telecommunication equipment costs have gone down. Therefore communication service have fallen in price (the Internet price in particular).

Cellular Towers Usage

Pluses:

- single payment minimization;
- constant improvement of the towers;
- electric supply;
- communication buses;
- equipment safety.
- Minuses:
 - not everywhere;
 - limited equipment mass;
 - rental payment.



Quality Comparison

	Pluses	Minuses Not accurate. Human factor influence	
Human	The easiest way		
TV video set	High direction detection accuracy	Electricity needed. Additional watch towers requirements.	
Fire towers net	Human factor minimization	Electricity needed. Man should have his own net	
Cellular towers net	Infrastructure. Human factor minimization	Coverage area extension needed	

"Lesnoy Dozor" ("Forest Watch" – transl.) Surveillance System Scheme



Hardware

The hardware part is special surveillance equipment (video cameras, thermal imagers, infrared cameras, etc.), that are installed on various towers. These sensors observe the adjacent zone and transmit the video to control centers at once.

There are:

 Remote control sensors (IP video cameras, thermal imagers, infrared cameras, etc.) which are placed on:

- Cellular towers;
- TV towers;
- Any tower.

• Communication equipment – equipment for Internet data transmission.

• Control center operator equipment (PC + Internet).



Software

The general functions of the system are hold with the help of "Lesnoy Dozor" software.

Client Software "Lesnoy Dozor" provides an operator opportunity to observe forests and detect fires. The software is linked with a server and has a diverse functionality.



Software. Map Functions

Map gives access to all control elements of the system.

All customer's map layers could be integrated. For example, forest management data.



Software. Information Systems Data Integration

1. Weather data.

The most dangerous forest areas are colored with "red" and "pink". 5 levels of fire danger.

2. Satellite data.

Information about current forest fires is placed on an interactive PC map.



Software. Sensor functions



There are:

• The sensors control: horizontal and vertical rotation, zoom, resolution and video image quality.

• Opportunity to plot forest fires coordinates (coordinate dimensioning).

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- Multiscreen mode.
 Option to point out important objects on the screen (buildings, constructions, etc.).
- Sensors patrol routes creation.

Software. Plotting out Coordinates



It is possible to detect the ignition location from **one camera**:

 proceeding from the analysis of the image, the chosen scale, the map and the objects located on it.

However the coordinates definition is preferable with the help of **two** cameras :

automatic definition on the cross of cameras visibility sectors.



System «Lesnoy Dozor» ("Forest Watch"). Possibilities. Advantages

1. Automatic danderous objects detection (fire, smoke). In test-mode available. It is very useful when one operator controls more than 10 sensors at once.

2. Plotting out coordinates by means of one sensor (some areas are not covered with two cameras, traditional methods help to find out only direction).

3. Data integration from other information systems (satellite, terrestrial, etc.).

4. Access to the system from a mobile phone.





The System Features

- Coverage range detection: <u>within 30 km</u>.
- Direction detection accuracy: <u>0,5 degree</u>.
- Detection accuracy: +/- 250 m.
- Time to alert:

approx. 10 minutes.

 Number of sensors that could be controlled by one operator:

up to15 (up to 50 in the long term).

Number of system controlled surveillance points:

without limit.





ForCAS

None of the modern forest fires systems can be detection preliminary deployed without That's why our design. developed have specialists ForCAS — methodology and a set of tools in order to configure "Lesnoy Dozor" system to satisfy ForCAS customers' wants. Analysis (Forest Coverage allows customers to System) Dozor" "Lesnoy estimate functionality in general as well as its specific characteristics and correct them in a good time if needed.



Our Customers: Regions

The early warning system for forest fires "Lesnoy Dozor" is generally bought by state and private companies in 12 regions of Russia and Byelorussia.

The system's been implemented in

- 1. Nyzhniy Novgorod Region.
- 2. Tver Region.
- 3. Respublika Komi.
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- 6. Moscow Region.
- 7. Vologda Region.
- 8. Kursk Region.
- 9. Kemerovo Region.
- 10. Tobolsk Region.
- 11. Kaliningrad Region.
- 12. Homyel' Region (White Russia).

Today negotiations are hold with

- 1. Ukraine
- 2. Belarus
- 3. Kazakhstan
- 4. Russian Federation:

Tomsk Region, Respublika Buryatiya, Smolensk Oblast, Respublika Kareliya, etc.



Group of Companies «Distant Systems Control»

- 1.The hardware and software system «Lesnoy Dozor» developer and the copyright owner.
- 2.The winner of different government support and development programs (regional and federal level).
- 3.The winner of competitions of innovative projects and competitions sponsored by Privolzhsky regional center of the Ministry of Emergency Measures of Russia.
- 4.Cooperation with major Russian universities and IT companies. Microsoft BizSpark[™] program participant.
- 5. The innovative process participant.



Achievements

- <u>2009</u>: the most effective innovation project of the forum "United Russia" (Nizhniy Novgorod).
- <u>2010</u>: the winner of Federal innovation companies support program.
- ✤ <u>2010</u>: the winner of Russian Venture Fair.





- <u>2011</u>: the winner of the contest "Start-Up of the Year". The best socially-significant project (Russia).
- 2011: the silver medal of "Exhibition of Inventions Geneva".
- <u>2011</u>: the participant of exhibition "Scientific and Technical Achievements of Russia" in Madrid.
- <u>2011</u>: ITU TELECOM WORLD 2011 participant (Switzerland).

Achievements



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- On the 4th of May 2011 project "Lesnoy Dozor" took part in "Innovation and Advanced Manufacturing Sciences Days of EMERCOM of Russia" where it was presented to Sergey Shoigu (Russian Minister of Civil Defence, Emergencies and Disaster Relief).
- On the 7th of July 2011 "Lesnoy Dozor" was publicly supported by President Medvedev at the official meeting with the participants of International Forum Seliger.





In Februar 2012 LLC **DSC** entered Skolkovo Innovation Centre (IT Cluster).

Our Service

- Cellular communication infrastructure adaptation.
- · Appropriate selection of surveillance equipment.
- technical document preparation (wiring diagrams, installation-specific settings, etc.).
- Installation, balancing and commissioning (on our own or by means of our partner to reduce customer's expenses. Now we are looking for such partner in Europe.
- "Lesnoy Dozor "software service and upgrade."
- We are also ready to improve our software in order to meet customer's requirements. For example, to integrate it with other information systems for the purpose of:
 - forest monitoring (satellite, terrestrial, aircraft);
 - forest inventory;
 - forest fires warning;
 - forest fires forecasting;
 - forest fires extension modeling.





Partners

Our partners are the leading Russian and international firms in various market segments:

- ✓ mobile operators;
- ✓ monitoring equipment manufacturers;
- ✓ some other developers of early warning systems for forest fires.



Contact Information

- Limited Liability Company DSC
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 - Ivan Shishalov <u>shishalov@lesdozor.ru</u>
- Technical Director
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- Marketing and PR Expert
 - Nikolay Kochnev <u>kochnev@lesdozor.ru</u>

Сколково

"Lesnoy Dozor" – We Prevent Forest Fires!





About Us: the History & the Team



Limited Liability Company **DSC** was founded in the city of Nizhny Novgorod in 2008. The company is a resident of Nizhegorodskiy Innovation Business Incubator and IT-park "Ankudinovka". The teams develop, sell and implement the early warning system for forest fires "Lesnoy Dozor" ("Forest/Wood Watch").



– Ivan Shishalov – Managing Director and the architect of the project. Graduated Lobachevsky State University of Nizhny Novgorod with honors. Gained professional experience in Intel, Wireless Net Lab and Video City. Underwent a training in Intel Labs Berkeley. A patent holder for 4 inventions and an author of more than 20 scientific publications.



- Yaroslav Solovyov - Technical Director. Graduated Lobachevsky State University of Nizhny Novgorod (Radiophysical Department). Obtained experience in *Encotes*, *Video City* and *Tele-M* as Developer and then as Project Manager.



– Andrey Filimonov – Director of Software Engineering. PhD in the field of applied mathematics. A scientific associate at Lobachevsky National Research University of Nizhny Novgorod. Worked in international companies *Teleca* and *Telma* more than 8 years as Developer, SW engineer and Senior Project Manager



- Nikolay Kochnev - Marketing and PR Expert. Graduated Linguistics University of Nizhny Novgorod with honors. Underwent a training at Cologne University of Applied Sciences. Prize winner/ winner of *Russian, UNICEF* and *British Council* TV contests.

About Us: Achievements

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About Us: Partners



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MTC

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CC NCC.

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JSC Research Institute Rastr.





- LLC INKOM. Skolkovo Innovation Centre.
- WWF, Amur branch.

LLC SB - Legion.

Nizhegorodskiy Innovation Business-Incubator (NIBI). LLC Integrator (group of companies Etype).

JSC The Central Research Institute Cyclone.

ScanEx Research and Development Center.

Federal Goverment Agency Avialesoohrana.











About Us: Where & What for?



Our system is used in Russia, though it could be applied practically in any part of the world (for example in Europe).



Statistics show that the average number of forest fires occurred in the European Union between 1990 and 2009 is about 75 000. As for the average yearly burnt area it is about 470 000 hectares (almost twice as big as the area of Luxembourg).

Forest Fires in the EU (between 1990	
Burnt area (ha)	468 029
Number of forest fires	76 382

Some countries could be a good example how people should protect forest. Germany is one of them (less than 0,5 % of the burnt EU area). But even in Germany the average forest fire damage is about 2,2 million euro a year.

Our Customers: Regions



The early warning system for forest fires "Lesnoy Dozor" is generally bought by state and private companies in 12 Russian and Byelorussian regions.

The system's been implemented in

1. Nyzhniy Novgorod Region. 2. Tver Region. 3. Respublika Komi. 4. Amur Region. 5. Respublika Mariy El. 6. Moscow Region. 7. Vologda Region. 8. Kursk Region. 9. Kemerovo Region. 10. Tambov Region 11. Kaliningrad Region. 12. Homyel' Region (Byelorussia) Today negotiations are hold with 1. Ukraine 2. Belarus 3. Kazakhstan 4. Russian Federation: Tomsk Region, Respublika Buryatiya, Smolensk Oblast, Kaliningrad Oblast, Respublika Kareliya, etc.



The Product: System "Lesnoy Dozor"

Today the main product of the company is "Lesnoy Dozor". It is an early warning system for forest fires. The system is also good at plotting fires' coordinates. For this towers, modern purpose any equipment and own software are used. All this helps "Lesnoy Dozor" to find forest fires efficiently.



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The Product: System "Lesnoy Dozor"



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The system operation principle is rather simple. Special surveillance (video equipment cameras, thermal imagers, infrared cameras, etc.) is installed on various towers. These sensors observe the adjacent zone and transmit the video to control centers at once. As soon as forest the control fires are detected center operator is warned by the system; at the same time the video and the coordinates are showed on the display of his computer. After that the operator makes the final decision.

The Product: System "Lesnoy Dozor"

None of the modern forest fires systems be detection can deployed without preliminary design. That's why our specialists have developed ForCAS — methodology and a set of tools in order to configure "Lesnoy Dozor" system to satisfy customers' wants. ForCAS (Forest Analysis Coverage System) allows customers to "Lesnoy Dozor" estimate functionality in general as well as its specific characteristics and correct them in a good time if needed.



The Product: System "Lesnoy Dozor"





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The Product: the System's Technologies



The Product: the Hardware Advantages





The Product: the Information Advantages



The Product: the System Features

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THE

The Product: Why Today?

The number of cellular towers has grown up rapidly, which means that their coverage area has increased.

Digital technology costs have decreased. At the same time DT is used almost everywhere.

Shortage of manpower and manpower costs have raised.

Surveillance equipment has decreased. (camcorders, infrared cameras, infrared imagers, etc.). Moreover, technical features have improved.

Telecommunication equipment costs have gone down. Therefore communication service have fallen in price (the Internet price in particular).

The Product: + Service & Implementation



In general we are able to do everything ourselves.

System engineering & equipment selection by means of our own simulation program.

The customers' wishes, infrastructure, lay of land, different kinds equipment and so on are taken into consideration.

Procurement and installation of equipment, balancing and commissioning.

Maintenance of the system.

"Lesnoy Dozor" software SaaS sell.

SaaS is a delivery model, in which we develop and upgrade software, provide our clients with access to it via the Internet and give advice when they need help.



The Product: + Service & Implementation

But we think that it is better to cooperate with partners. For example, in this way:

System engineering & equipment selection by means of our own simulation program.

The customers' wishes, infrastructure, lay of land, different kinds equipment and so on are taken into consideration.

Procurement and installation of equipment, balancing and commissioning.

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The Partners: with Whom & What for?



We are looking for partners/investors to distribute early warning system for forest fires "Lesnoy Dozor".



The Partners: Forms of Partnership...





... with a partner.

The system "Lesnoy Dozor" is promoted and sold in certain regions by a partner, who receives a fee. At the same time he installs, services and sets the system into action.



... with an investor.



He invests money, gains profit and tries to find a partner, who will adapt the system to the requirements of a certain market.



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"Lesnoy Dozor" – We Defend Forest From Fires!

