



Brighcore division is part of **Elma Kurtalj Ltd.** Croatian company involved for year in telecom infrastructure and building automation. Since its establishment in 1991, the company expressed its determination to deliver top quality solutions in all aspects of its operation, which is confirmed by ISO 90001. All our products and solutions are based at open automation protocol structures where special care is given to security end future open 3rd party extendibility of the system. Our customers are from large Pharmaceutical companies to Telco providers. The technology is deployed from Public buildings to Data centres.

The company operates from locations in Zagreb, through division structural model as follows: Energy Consulting, Building Automation and Process Automation, (HVAC, energy, lighting, CCTV, switchgear automation, access control), ICT, manufacturing equipment and software. As experts we are able to identify infrastructure needs and solutions and position ourselves in front of the customers with clear "Return-Of-Investment" arguments. From 2011 we have an office in Munich Germany.

Among other divisions the Automation Contracting division and BrightCore division are the most dynamic parts of the company today. BrightCore division is an R&D part of the company.

For years we are combining our R&D and engineering capabilities with excellent logistic support to deliver advance solutions based at open protocol multivendor HW automation gear with our software solutions and engineering services.

Field experience and customer needs were key drivers and the most important guides in development of what we today call "**BrightCore Network Operating System for Buildings**" or in short **B.NOS.fb**.

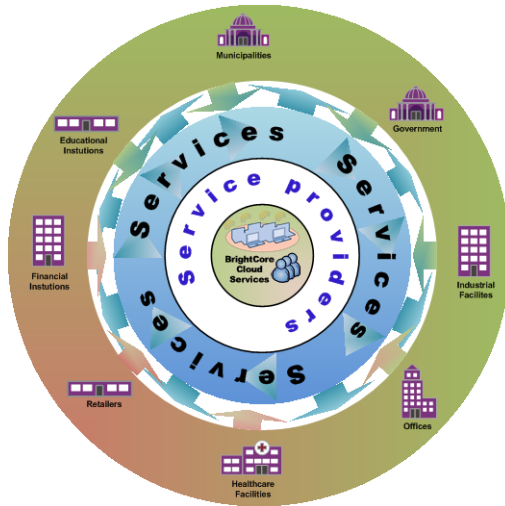
Together with Automation department at Zagreb's 94 years old Faculty of Electrical Engineering and Computing we are exploring the future of building automation. Currently, our **B.NOS.fb** serves as a base for a

real time modelling study of multiprotocol smart building behaviour.

This experience and market requirements helped us to develop enhanced software products family open to simple and seamless integration of building automation networks with ICT 3rd party solutions and products. At the end, delivered system integrate automation network into corporate environment where automation network act as just as another database. Whole system fits well into the Cloud model too.

Provided solutions are based at open protocols like LonWorks, BACnet, Modbus, Zigbee and KNX and the **B.NOS.fb** works as a glue between real word and ICT environment helping to all stakeholders to stay in this ECO-Business-System from Building Owner to Contractors, Consultants and all System Services and Products Vendors.

B.NOS.fb is specially design to support organizations who have a lot of geographically distributed buildings of any size and would like to lower there building automation commissioning, energy and generally life cycle maintenance expenses through usage of open automaton protocols and multivendor architecture. The only requirements that **B.NOS.fb** puts on the table is that all automation devices have to be based at the Open Automation Standards like BACnet, KNX, LonWorks, Modbus, Zigbee, OpenCan or any other standardized automation protocol. The **B.NOS.fb** combines unique open source model for edge servers & clients with Secure-Close-Source-Communication-Network-Infrastructure flavoured with a billing system for services.

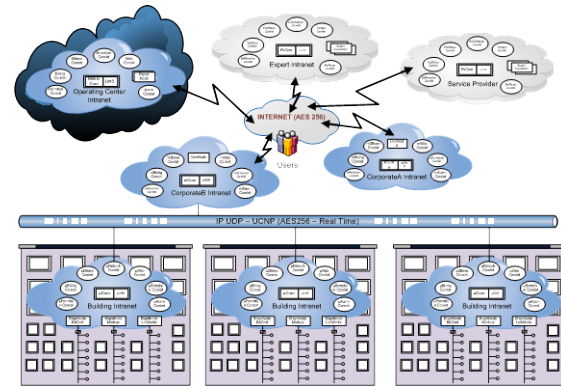


The **B.NOS.fb** uses ontology concept in integration of dissimilar networks through the abstract object based control network model.

The ontology is used for abstracting existing building automation networks (LonWorks, BACnet, and KNX, Zigbee, Modbus or any other) and for creation of a generic control network model. All management and configuration tasks are performed regardless of BAS or any automation technology used as well the integration capabilities are open towards Cloud based services.

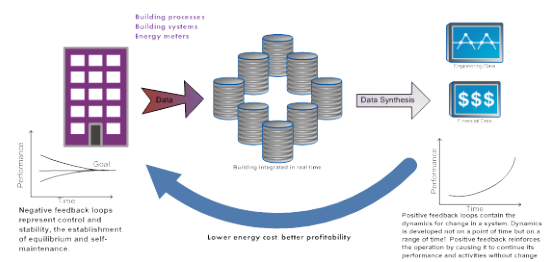
The biggest benefit of such a system is avoidance of gateways (protocol translators). We do not need rules how to do mapping between dissimilar protocols any more, since every protocol is mapped just once to abstract representation within a generic control network model. Having such a common base for all protocols opens us one to one data relationship between dissimilar protocols, as well one to many relationships too. We have single mapping defined, therefore we moved Mapping from technology to ontology. Extension of **B.NOS.fb** to other protocols is very simple. Clearly, all integration models what we used to use within one protocol network, for example, LonWorks, we are now extending to multi protocol domain. We simply bind data encapsulated into object from LonWorks to Modbus or from LonWorks to BACnet. Within **B.NOS.fb**, all that is accomplished through a BrightCore Builder, which is a commissioning, integration and business process management tool which help to integrate M2M, M2S, S2S, M2C, S2C

infrastructure, and in the same time provides plug-in possibility for 3rd party add-ons.



The **B.NOS.fb** opens space to ICT professionals, by Shell API. It is not important do they understand in full the automation processes. They do not have to be necessarily experts in the automation, to build connections from Building technical systems to Enterprise class of applications and Cloud services, as well to build special corporate applications like the energy management dashboards or any other application which needs to be feed with data from technical systems and databases simultaneously. The applications developed are absolutely agnostics to native automation protocol used on the field within the building. In other words, the same application or service could server any protocol.

All products developed at the top of the Shell API could be offered to market as separate products through three domains: server centric, cloud services centric and end-user application centric. The model opens very clear billing eco-system for all stockholders putting a “units-under-service” as key measurement criteria for monetisation of service or application provided from and to stockholders. It opens a PhD expert knowledge to the smallest building at daily base within ADSL price range.

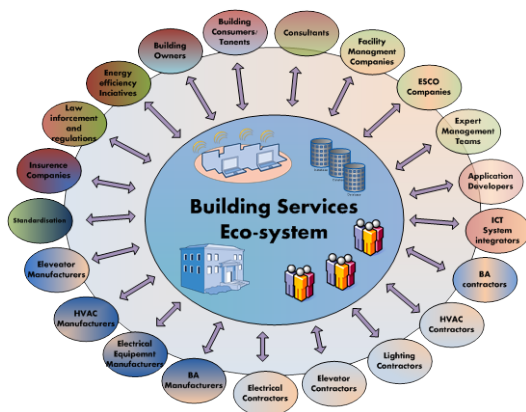


Focus is the needs of the consumers and not the technology. Besides this, technological solution primary helps by connecting devices from the different syntactic and semantic networks. From the control network point of view particular control network BrightNode is just another node of the network seen from other local network devices as any other M2M node.

The novelty what **B.NOS.fb** brings is in complete “syntactic-semantic notion of network infrastructure,” making it expandable to hundreds of buildings and at the same time preserving the integrity of the local control network infrastructure. In principle, the model follows the way of connecting today ICT infrastructure like LAN and WAN, with modern Telecom operator exchangeability approach. The main difference is that instead of routing of just the information packets (data) through communication links it handles the content (information) by usage of a common class/objects model.

It is a solution, which is solving large campus integration problems, smart city issues, as well solving of efficient integration of large geographically distributed multi vendor building automation networks and their secure connectivity to Cloud services by closing all data into real time AES 256 envelope.

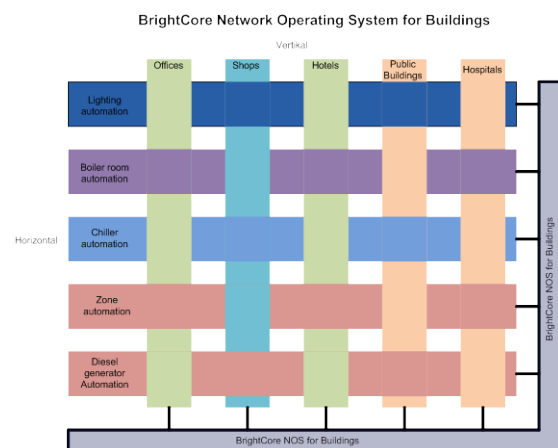
Currently, it could work from small embedded devices to 19" servers, from ARM to Intel processor and the user could communicate with the building from Windows, Linux and Android devices.



Within **B.NOS.fb** we distinguish Technical Users, Consumers, Service Providers and

Application developers. The technical users are people who manage the building and the Consumers are people who work in the building (they could manage just spaces where they are working for example). The **B.NOS.fb** is designed with idea to open Building automation to ICT developers putting in same attitude automation devices and specialized servers which could be at the same network or anywhere else accessible over Internet, as well to provide manufacturers with data from there devices for behaviour analyses. It could be used as a gear for real time Car Management System over 3G too, providing manufactures and service organisations with big data directly from the car in real time.

Since, it is designed as a operating system it could be added to any deployed building automation network or automation structure without compromising delivered solution regardless of origin (Siemens, Honeywell, Schneider Electric, or multivendor network based at any of standardized automation protocols...). These entire automation network **B,NOS.fb** will see as a separate Networks and will be able to exchange data between these networks at the M2M level.

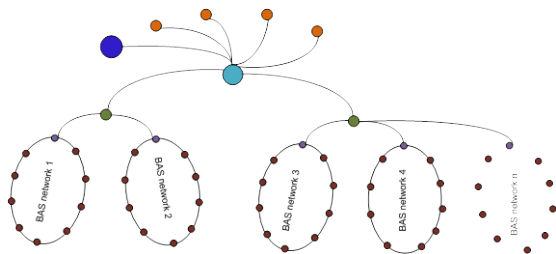


Currently, supports Modbus, BACnet and LonWorks, KNX and OpenCan will be out in April 2014. What is unique is that through API and SDK (C++, Java, Python; Linux, Windows) as well through sample open source applications **B.NOS.fb** opens possibility to make simple and affordable integration between automation infrastructure and ICT applications and services. It is specially suited

for management of small buildings (less than 1000m2) or automated objects (Cars). We are in the process to offer it as a Cloud solution, since from the very beginning it is designed to support cloud model philosophy.

Simple description of **B.NOS.fb** domain (interactions between various systems in today Multi-building or Multi-object structures) could be explained as having people from different nationalities, language, & culture work on a same project remotely. As we have these cultural difference executions of the common tasks efficiently is challenging and demanding. To be able to overcome these differences, we have to build common multi cultural multilingual management environment. The environment with ability to overcome efficiently the differences, speeds up the communication and secure task execution, as well ensure proper and timely exchange of ideas regardless of distance.

By acquiring usage of standardized common languages in the organization we gain competitive advantage for better negotiation, up gradation (in case of obsolete). Therefore, managing of staff with multiple competencies becomes a much easier task.



Similar to this example are the different between Automation System languages (protocols) which are acting as a core interaction layer between various devices and systems in the buildings or generally in automation networks. The simple idea is to have the data sharing for optimum enhanced process controls, reporting and knowledge based servicing. In the traditional building automation conceptual design is a language translator (Protocol convertor) between various proprietary or open and semi-open systems who insure interoperability. Such solutions will increase cost, shade local network nodes from one network to another network and create a single point of failure. Such topology at the

application / management layer will create a single point of failure for reporting and delivery of global strategies based on real time data flow from the buildings. At the end it creates very pore Risk Management assessment result and keeps the system unstable.

Mostly, we are seeing it through high maintenance costs as well through high stock of the spares, support costs, complex integration with ICT services and all together complexity of multiple proprietary system management. On contrary, creating one common language layer move out that single point of failure, and create a very stable and easy manageable, open sustainable and remotely maintainable system infrastructure. What at the end is a holly grail of the Intelligent Building or the vertex of smart city infrastructure!

Creation of technology where the devices and networks comply, even if they are produced by different vendors and talks different languages, represents a major move to really open cloud enabled M2M systems. And, that is exactly what **B.NOS.fb** does!

