



A SOFTWARE SOUL FOR TOMORROW'S NETWORK

HOW AI AND AUTOMATION WILL CHANGE NETWORKING

We cannot talk about automation in telecommunications without considering the important changes that are ongoing across the industry. In the wake of the paradigm-shift introduced by the cloud revolution, networking is evolving too. This is because there is growing need for scalability.

There are different reasons behind this request, including the continuous need for larger bandwidth connections, an exponential rise of devices on the network, a larger amount of data to manage and, finally, an ever-increasing user mobility and a need for services to be accessed anywhere in the "cloud" mode.

In this context, the software component, automation and artificial intelligence will be strategic for managing processes and ensuring support for decisions. This will expand our ability to get data and information on the network functioning and to plan developments in real-time.

A new paradigm in networking layers or "bricks"?

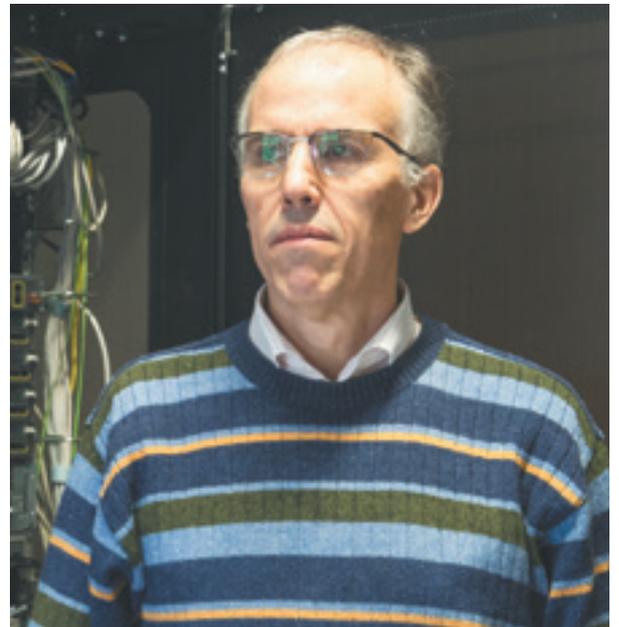
The current network model is based on a multi-level architecture. For each level there is a corresponding element (fibres, amplification and transmission equipment, IP routers, etc.) strictly connected in a hierarchical way. It is almost a static system, which requires manual configurations, and presents rigid points of demarcation. It works and it is resilient, but this network stability is paid in terms of adaptability. Today, however, we observe a different trend: from a vertical organisation in layers we are moving to a "brick" model, where a service is no longer composed by organising the components in a logical sequence, but by accessing the resources in a direct way. It is a disaggregated model and we can represent networks, apparatuses and network functions as different resources that produce different services when they are combined.

Software Defined Services vs hardware constrained networks

In this scenario, the software element acquires an increasing importance, while hardware is increasingly considered as a simple and inexpensive commodity, which has to be first of all flexible and easy to set up. This change is already underway and the OTTs are benefiting of it. From a "layered" model we are moving to a "functional" model, where the concept of service to the end user is completely modified because every single component (transmission, storage, computing, firewall ...) becomes a service to be combined with others as needed. How do you put the different components together? How is this complexity managed? At this stage an important role is played by automation and in particular by the so-called "declarative" model: In this model we first declare (describe) the service architecture, and then the software decides how to carry out the process to achieve the goal. Introducing the concept of "zero touch networking", Bikash Koley, director of Google network architecture, said that 70% of network malfunctions are due to human interventions, since the human mind is unable to record the complexity of the "state of the art" of the network, which is made up of different variables and functions: this is why software intervention is absolutely essential. We are therefore advancing towards an intent-based networking, as stated by Gartner.

Fault finding via AI

In the current model it is easier to solve a dysfunction because you can just identify the level where the dysfunction happens, access it and act on it, while in the functional model it is necessary to access different information from all components involved and make correlations to understand where the problem is. For sure, a key role will be played by artificial intelligence that can analyse the different components, in support of decision models. The business organisation will still be based on functions, thus the roles of the network specialist, the software specialist and the IT specialist won't disappear, but



the services will involve different functions so we can suppose that this will affect in some way the organisational model.

Accelerated Service Development

Why did we get to this model? A very strong reason is that the speed in producing innovation is increasingly required. Thanks to the high flexibility of this new model, it is possible to create more services and to reduce the implementation time: in the first model it takes 2-3 years for developing a service (which remains operational for 7 years) while in the disaggregated model it takes only a few months to build new services (with a shorter life cycle and calibrated on real needs).

Reducing costs

But there is also an economic motivation: the cost of the layered model is no longer affordable because in order to increase performance, the whole infrastructure needs to be modified, while in the new model it is possible to operate only on a specific element, for example by setting up the optic part to achieve a bandwidth upgrade. Of course there are some risks, above all in relation to the responsibility models and the definition of communication channels between the different elements, but also in security management, which requires an increasingly widespread control and faster operations to mitigate the effects of a vulnerability. In relation to that, AI becomes a very important enabling tool. As part of GARR research network, we have developed a White Paper available online (see www.garr.it) and analysed all these issues together with our research community, with the purpose of anticipating changes. Making a smart network will be the end result, just because I think that nobody would like a dumb network...

Words
Massimo Carboni, GARR, the Italian academic and research network