

# Smart Client ... Smart SLA !

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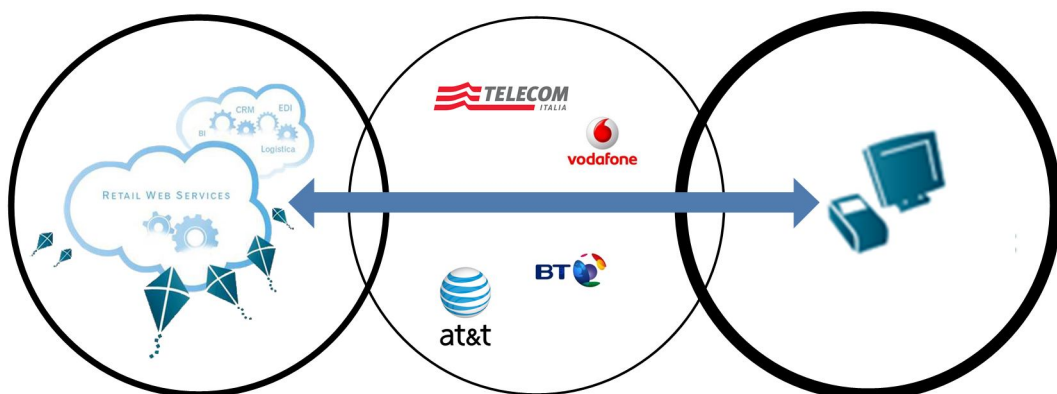
## The Total SLA

In assessing the quality of software services provided from the Internet, focus is mainly on the Service Level Agreement (SLA) of the Cloud Computing platform from which they are delivered and less attention is paid to the fact that the end result depends on the connectivity SLA provided by telephone companies, and finally from PCs, thin clients and routers deployed at the edge.

In Retail Stores, the Front-Store SLA should be higher than many other business services, because POS is characterized by relatively small and frequent transactions that cannot be postponed. In a temporary POS blackout, real customers can be lost, not only sales! In contrast, in a B2B environment often a document issue can be postponed without serious disruption to the customer.

The SLA is the % of time with regular service, in other words the probability that everything runs smoothly. Difference to 100 is instead the probability of a service halt. For example, a better than 99.9 % SLA is equivalent to a failure probability lower than 0.1 %.

When service are provided by datacenters that may have blackouts, delivered through lines that can disconnect and used by a PC that can fail, the intuitive conclusion is that the chain cannot be stronger than its weakest link. In mathematical terms, the probability of a regular service is the product of individual SLA.



To build some quantitative reasoning, we make the following assumptions:

$$SLA_{\text{Cloud}} > 99,9 \%$$

$$SLA_{\text{Line}} > 99\%$$

$$SLA_{\text{PC}} > 99,99\%$$

Figures are hypothetical, except those of Cloud Computing that meets the minimum guaranteed by Microsoft for Windows Azure. According to these assumptions, the probability of a regular service is

$$SLA_{Total} = SLA_{Cloud} * SLA_{Line} * SLA_{PC} > 99,9\% * 99\% * 99,99\% = \mathbf{98,89\%}$$

Even though the Cloud SLA could improve to the exceptional value of 99.999 %, the final situation would not improve significantly. In fact:

$$SLA'_{Total} = SLA'_{Cloud} * SLA_{Line} * SLA_{PC} > 99,999\% * 99\% * 99,99\% = \mathbf{98,989\%}$$

Then a huge effort to increase one hundred times the Cloud SLA, would rise the final value from 98.89 to 98.989 % only. **By the way it is intuitive that is of little use to further strengthen the more robust link, and that focus should go instead on the weakest one.**

It may seem ungenerous to the telecommunications companies to identify them as the weakest link in the chain. Clearly, many of them are able to provide high SLA connectivity, or redundant wired or wireless connection to reduce the last mile problems, but at higher cost and complexity. When the extra line should awaken after years, will it do instantly and without problems ? The difficulty arises not so much for the chain HQ, given the low incidence on total costs of a second or third channel to the Internet, but for individual stores, especially if small and numerous, some of whom may not even served by a normal ADSL line.

An important aspect of line failures are not their frequency, but their duration. In the case of regular telephone lines it is a common experience that failures are infrequent but several hours long.

Moreover, when considering SLA, the **period to which it is measured** is often neglected. A failure of 1 entire day during 1 month represents a probability of more than 3.3 % (1/30) and a SLA lower than 96.7 %. If measured on an annual basis, the probability falls to 0.28 % (1/360) and SLA moves to a more presentable 99.72 %. **Clearly, the month is the maximum period over which the SLA should be measured.**

As for the PC, professional products with UPS and subject to proper management are assumed. It is common experience that in such situation, the PC is the most reliable link. The 99.99 % SLA used in the example is just an order of magnitude. Furthermore, a system with multiple POS in the same store can be designed without any single point of failure, so a PC or external device fault cause a service degradation but not a stop. For this reasons, the PC and other HW failure impact is neglected in the remaining considerations.

## ***Is SLA condemned to low values or high costs in Retail Stores ?***

Rather than looking for solutions inside a pre-internet vision and keep adding complexity through more options and additional redundancy, it is possible to move to a new paradigm based on Service Oriented Architectures (SOA) and Smart Clients, dividing carefully **services in Embedded and Global**. The first group, related to prices, promotions, customers, etc., essential for normal operations, are Embedded in each POS by means of a local compact database, while Global Services, related for example to inventory and reports, are managed from the Clouds and natively shared across the entire chain and even with partners.

Smart Clients are lightweight and Internet-centric applications deployed automatically from a web page at cost and speed comparable to thin clients. They use Embedded and Global services seamlessly in connected AND disconnected mode. Embedded services are also faster because they do not suffer any Internet latency. When a customer has made his choice, he does not want to waste time queuing at the checkout !

Smart Client to Cloud communication, and vice versa, can be based on asynchronous message queues, adding further scalability and reliability even in intermittent and low speed environments.

If some chains consider Global services 100% availability vital and cannot bear the risk of a normal line, a back-up one can be added, as usually done in thin clients or browser based solutions. But even in this case, a Smart Client solution has a vast scalability and speed advantage.

### ***Smart SLA***

Starting from a Cloud Computing 99.9 % SLA, the inevitable connectivity degradation lowers the value available at the edge. To develop the subsequent considerations, we assume that values are between:

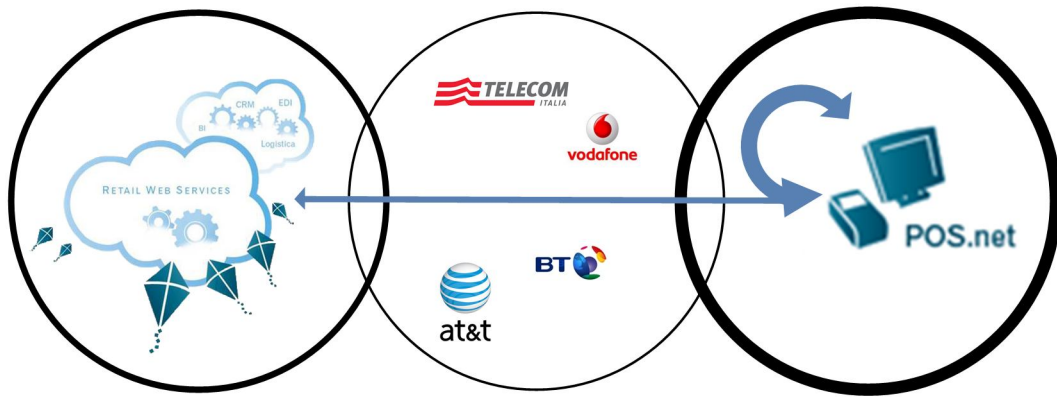
- 98,9 % with 1 line ( $SLA_{Cloud} 99,9 \% * SLA_{1Line} 99 \%$ )
  - 99,89 % with a second backup line ( $SLA_{Cloud} 99,9 \% * SLA_{2Lines} 99,99 \%$ ).
- Mathematical steps to prove that two lines each with 99 % SLA offer a total value of 99.99 % are simple and are omitted.

In a software service used through thin client or browser, SLA is between:

$$98,9 \% < SLA_{ThinClient} < 99,89 \%$$

Looking at the situation from the failure probability standpoint, it is between:

$$0,11 \% < P_{Cloud+Line} < 1,1 \%$$



In a distributed and service-oriented architecture, based on local and remote services, problems arise only if connectivity is lacking when centralized services must be provided. If connectivity is missing when normal services are delivered, no degradation is perceived.

The frequency with which special services that come only from the Clouds are provided in the Stores depends on the sector and, within it, on the chain distinctive characteristics. A range from 1 % up to 10 % can be assumed

$$1 \% < P_{\text{GlobalServices}} < 10 \%$$

The probability that two events occur together is the product of individual probabilities and it is within the range:

$$0,11 \% * 1 \% < P_{\text{ServiceKO}} < 1,1 \% * 10 \%$$

$$0,0011 \% < P_{\text{ServiceKO}} < 0,11 \%$$

Transformed in SLA figures:

$$99,89 \% < SLA_{\text{SmartClient}} < 99,9989 \%$$

Where the worst case is related to a single line and high online transactions frequency and the best case is that of a double line and low frequency.

Please recall that initial SLA was between 98.89 % and 99.89 % and the **improvement** is from one to two orders of magnitude (**10 to 100 times**).

How can SLA be improved without intervening on the individual components through which it is delivered? Knowing even superficially the principles and laws of probability and physics, this seems to defy logic.

The intuitive answer is that a **chain cannot be stronger than the weakest link**, but is possible to reduce failures **using it as less as possible**.

## **aKite : a Smart SLA SaaS**

**aKite** is a POS and In-Store SaaS suite ([www.akite.net](http://www.akite.net)) designed to fully exploit the advantages of a modern PaaS (Platform-as-a-Service) as Microsoft Windows Azure, like, for example, near-infinite scalability, efficient resources usage and very high and guaranteed SLA.

Although **Retail Web Services**, the intelligent hub in the Clouds which manages the Stores Smart Clients and deliver standard Global services, is state of art, aKite Embedded services on SQL Compact Edition database reduce Stores dependency on connectivity and, at the same time, accelerate POS operations. Moreover the system is designed to avoid any single point of failure on multiple POS environments.

Deployment is completely automatic from a Web page through Microsoft ClickOnce technology, achieving cost and speed similar to thin client or browser based solutions.

### **About BEDIN Shop Systems**

*The company has more than 20 years of experience in software development for retail stores and an internationally recognized innovation track record, including the first POS designed on .NET, the first intelligent hub between headquarters and stores based on Service-Oriented-Architecture (SOA) and delivered in SaaS mode, as well aKite: the first POS and In-Store SaaS suite designed for "real" Cloud Computing. Web [www.akite.net](http://www.akite.net) , email [wladimiro@bedin.it](mailto:wladimiro@bedin.it) , phone +39 0423 839834*

