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INFLUENCE OF THE PROSPECTIVE TECHNOLOGY IN THE FACADE'S DISFIGURATION OF THE HISTORICAL HOUSES. CASE OF THE OLD KSAR OF BECHAR

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Abstract

Filled with the dilemma of clinging to tradition and adapting to modernity, the ancient houses inherent in the ksar of Bechar (in southwest Algeria), notwithstanding legendary, are currently subject to obvious cultural transformations. Unpublished furnishings are now making way; new spaces are introduced, giving birth to facades in all their ugliness without any reference to the original. They appear to aspire to a priori a way of life distinct from that of ancestral confirmed by the fading of domestic practices of old. If traditional houses are now subject to endogenous and exogenous transmutation at the same time, this is the effect of the modernization of the capitalist economy, in homes in the third world where technology is far from being used to its proper value, defying the rules of local tradition and intrinsic culture. this article provides a solution to encourage the conservation of historic sites in the face of technological change. This research is mainly focusing on the search for a solution to the disfigurement of the facades, partly through the great presence of telephone cables, Internet cables and antenna dishes, knowing that developed countries have already avoided this problem by using smart technologies.

Keywords*: Traditional architecture; Technology development; Disfigurement of the facade; Cabling; Smart technology.*

Introduction

It is useless to be reminded that, in response to the utilitarian necessities of traditional societies, the vernacular architectures fashioned in the past, configure designs as original as they are interesting. *Singh, M.K., et al* [1] are not the only ones to confirm this. They combine harmonious links between the households, the inhabitants and the physical environment that encrusts them. Yet, even if these dwellings apt to tell societal history reflect the environmental, cultural and historical context in which they exist, they are unfortunately devolved to "evolution over time" [2]. An often-forgetful evolution of the historic and cultural dimension ineluctable, since modern architecture with its unprecedented technological capabilities and its innovative context is increasingly out of step with the solutions conferred by the architectural forms of the old. Although this modern-day advance makes it impossible to do a feedback, it must nonetheless work to draw lessons from it builders who have recognized the interdependence of human beings, buildings and the physical environment [2].

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In this conflict between tradition and modernity, some are nostalgic proving their passion for past productions by rejecting stereotypes in construction. According to Lynch, "The people have a long-standing relationship with parts of these communities. They imagine it as a place imbued with memories and meanings" [3]. At a time when contemporary societies standardize constructions for an economic purpose, they are moving away from models of ancient congregations "serving the citizens" who pride themselves "on the sensitivity of individuals and the diversity of vernacular customs and cultures" at the option of "Economic efficiency" [4].

Notwithstanding, contemporary technological contributions are not without consequences on the urban environment of yesteryear. It goes without saying on the architectural plan where changes of all kinds upset the facades. Therefore, it is questionable how their relationship can be reinterpreted in a sustainable and resilient vision, so as to respond to continuous changes in the landscape and the impact of modernism and new technologies on the disfigurement of the facade.

This paper is meant in this case as a quest for integration of new technologies in a positive way to minimize the disfigurement of the facade here present through the multiplicity cable.

Background

A mutation is a process by which a new constituency emerges by revising a pre-existing element by: substitution (substitution), addition (insertion), deletion (deletion) of one or more elements, "mutation" is synonymous with "transformation" In the Larousse dictionary (2001), in Architecture and Urbanism, it designates a brutal or slow or definitive transformation as transitory of the object as well as of its form or function, the question of "urban mutation" which is defined in The encyclopedia as "a phenomenon with decisive effects on the shape of the city, its urbanism, its organization, its urban landscape, its architecture, and especially on the quality of life of its inhabitants".

From this point of view, urban change is seen as the manifestation of a reorganization and introduction of a new form that affects not only the physical space, but also the social, functional, economic, and so on. the notion of space itself being extended.

According to the results of the typo morphological analysis carried out on the traditional houses inherent to the Bechar ksar as part of a doctoral thesis of Benslimane Nawalwe [5] arrived at results that the traditional house is mutated architecturally and socially on the following levels, presented in figure 1.

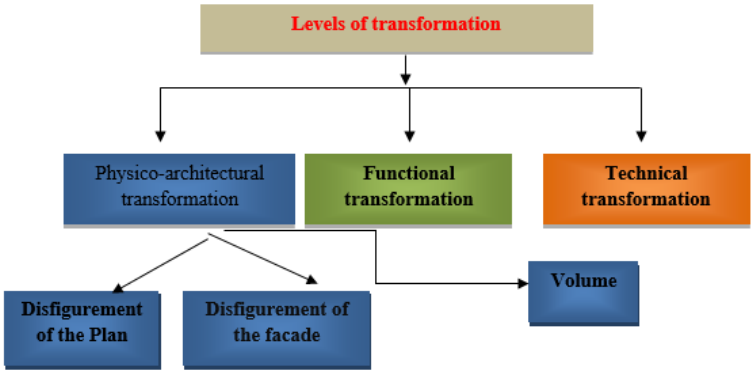


Fig. 1. Levels of transformation

This article deals with the transformation of the facade by the fact that it is the most apparent and proposes a solution to this problematic

Methodology

In order to answer the question posed above, the work of now goes through two phases:

- A conceptual approach illuminating vernacular prototypes and models, analyzing the mechanism that takes into account the cultural characteristics of the traditional house. (The definitions of concepts are drawn from, among others *S. Özkan et al* [6], and by *Y. Abdullah* [7].)
- An exploration of the impact of technology on the traditional facade and its degree of adaptation using a so-called modern technique ROF, used in the field of telecommunications among others to reduce the use of cables [8]. Elements that most disfigure the facade and the appearance of the traditional household, negatively affecting landscape perception. The simulation of the RoF system is adopted here to concede their optimization in terms of transmission quality, for details refer to *J.-L. Verneuil* [9].

Relativity landscape and technology

From the agrarian society to the contemporary society, passing through the industrial, each with its intrinsic symptoms has proliferated an atypical landscape subsequent to the social and economic nature, the historical and cultural foundations. Thus, the landscape is strongly linked to local character [10]. This is influenced more by many endogenous and exogenous factors, the technological progress of which largely contributes to the transmutation of the external appearance of buildings (in volume and facade).

Technology, as a mirror of societal evolution, promotes, wanting to satisfy needs and to ensure comfort and decent living conditions, mutate transmuting inevitably the landscape. Conversely, the landscape is seen as an imperative framework for the development of certain technological processes and their evolution in relation to recent issues such as those relating to ecology and the environment.

Dualistic vision between tradition and modernity

Being at the forefront of contemporary era concerns, sustainable designs are now a preeminent responsibility of architects. This environmentalist trend is justified by the outburst of universal torment through the use of energy and resources. In this context it would be interesting to refer to some fundamental principles of sustainability, including [11-13]. This new responsibility is, after all, inducing a change of tendency, from the transition from a penchant for unaccustomed architectural conformations to more modest vernacular forms, which are more economical in terms of energy. Indeed, local forms of construction capitalize users on the knowledge of how buildings can be effectively designed to promote cultural conservation and traditional wisdom [14, 15].

Increasingly adopted by professionals, the return to roots and tradition can only confirm that "local vernacular forms have proven energetic and *green*, refined by local resources, geography and climate" [16-18].

While long regarded as "inept or technologically rude" [19], or even "impossible to improve" [20], vernacular know-how is currently a source of inspiration for contemporary architecture. As confirmed by *M. Vellinga and L. Asquith* [21].

Today's perspective

The exponential evolution of contemporary productions is clearly facilitated by an ever increasing evolution of technicality, which affects the residential space. This rapid change known as modernization means that technical devices play an important role in the recomposition of residential space. Thus, television, object of prestige, takes place in the family stay. Similarly, refrigerators and stoves are used to specify a new room: the kitchen that was previously only a small corner in the household.

The technical objects thus contribute to replace the residential space in a so-called modern world, while preserving its cultural symptoms. The transition is then designated by *V. Scardigli* as "acculturation of the technique" [22]. The dynamics that characterize society can be

interpreted as "an approximate and ever-changing order, producing interactions of order and knowledge associated with them" [23].

Through these dynamics, optical telecommunications have reached their peak through their evolution and their agile and easy accessibility. Their multi-purpose demands however, there are negative aspects to the home-care system that will have to be tackled through intelligent systems.

Risk and peril of the facade disfiguration in the old ksar of Bechar:

Ksourian architecture in Bechar

Like the old Saharan settlements, the ksar of Bechar is in exord surrounded by walls. Its compact structure (Fig. 2) praising its religious building (mosque) is characterized by the sinuosity of its mazes (lanes) which lead to households. In this simplistic and environmentally friendly conformation, Ksourian residential dwellings are spontaneously arranged without networks. The old facade (Table 1) guaranteed the privacy of family life. But not only, by its architecture, it favoured the shade and helped to thwart with the narrow streets and sinuosity the prevailing winds and sand. The simplicity of the facade suggests that the system adopted in the vernacular design is introverted (Figs. 2 and 3).

Fig. 2. The photo shows an example of an alleyway in the traditional vernacular fabric covering the ground for shading in the streets and protecting the facades from solar rays

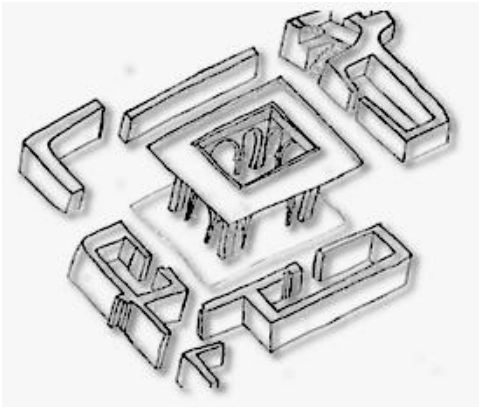


Fig. 3. The picture shows the shape of a patio interior,source authors

Ksourian architecture moulting to disfigurement

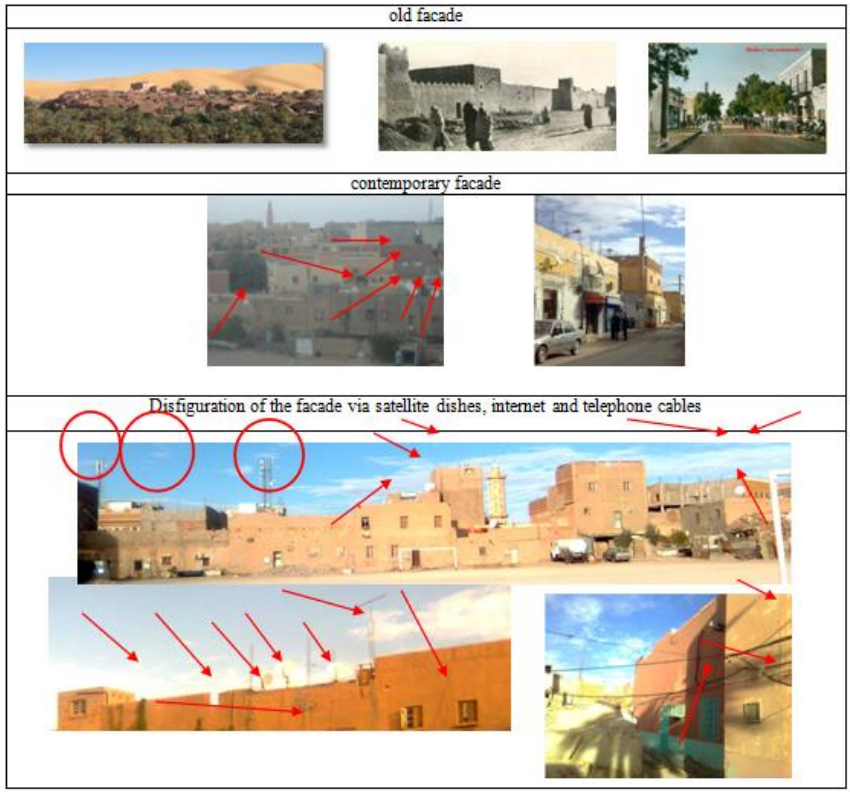
Nowadays, the exterior appearance of the households represented by the facade reveals distinct transmutations distinct from the old ways of doing things. All households are subject to physical deterioration over time, increasingly losing their ability to meet the needs and

expectations of residents. These failures are the result of many conceptual problems, a lack of constructive quality or the wrong choice of materials, or the specific conditions of maintenance and use [24]. Without forgetting the environmental conditions whose actions affect the facade being particularly sensitive to the effects of environmental agents since its surface is exposed to the direct influence of rain, wind, sunlight and atmospheric pollutants [25]. The visual deterioration and the disfigurement of the facade therefore have a fatal impact on the aesthetic performance of the outer envelope of the house, particularly on the quality of the urban environment as *P. Parnham* [26] and *I. Flores-Colen & J. de Brito* [27]. This inevitably leads to exorbitant extra economic costs for maintenance and upkeep [28, 29].

The Department of Town Planning, Architecture and Construction (DUAC), confirms the outrageous number of illicit constructions in the city of Bechar, without respect for the local architecture, disfiguring the landscape. In recent years, no one can dispute that the walls of facades (not excluded roofs) are heavily adorned in the anarchy of a multiplicity of cables and accessories such as electric cables, AEP, gas, antennas internet and parabolic to the point of disfiguring districts.

Hence the imperative need to find a decent solution, respectful of the built environment and the environment that molds it. Consequently, a model relating to satellite dishes and the Internet is proposed here.

Table 1. The transformation of the facades: a comparison between the old and the contemporary design, source authors



Principles that regent the traditional house from past to present

In table 2 are presented the characteristics of the facades before and after transformation.

Table 2. Facade transformations: comparison between ancient and temporary design, Source authors

Characteristics of the facade	Before transformation	After transformation
Roofs	Flat and soft roofs Arched domes Courtyards were not covered	Covered courtyards
Characteristics of the agglomeration	In harmony with topography	/
	Houses oriented according to Religious beliefs	/
	In accordance with the climate Narrow streets built	Larger streets
	Protected public areas from the sun Closed corridors to ensure privacy	Unspecified public microclimat model in extraversion
Materials of finish(finishing)	Clay for wall decoration Mixed bright colours and adobe texture	Artificial paint Earthenware
Rain water drainage	Ground floor than a natural normal ground level	Extension of the gable roof on the balconies
Heat absorption	Maximum heat absorption capacity Thick walls Courtyards	Minimal heat absorption capacity Vo open interior space
Opening	Small windows on the south facade of the building Patio	Balconies A lot of openings
Orientation (direction and positioning)	Construction introvertie avec cour sud	Extraverted building Unspecified orientation or position
Thermal mass usage	Compact layout Natural materials Natural colours Reduction of the temperature difference between day and night Use of high terminal capacity heavy materials	Linear Industrial materials Artificial colours Not defined only with artificial technical systems
Periodic arrangements for air circulation improvement	Use of small high windows to improve air circulation	Amélioration des turbulences de l'air dans la ventilation artificielle
Receiving sunlight in winter	Compactness according to the solar radiation, proportion of the plan	undefined
Air cooling	Use of soil thermal capacity by using water and trees in courtyards.	Artificial technical systems

The experience of cites developed for a new intelligent technology

One of the architectural perspectives of the new millennium, projects the integration of vernacular know-how to modern knowledge [21] having long ruled out any possibility of transmission of ideas and lessons of traditional productions. "Obviously refined by culture and social logic" [14, 15], the latter confer a range of lessons in the fields of architecture, design, sustainable techniques.

"Many of the criteria defining modernist design (such as Corbusier's five points of architecture)", often considered as radical innovations, are inspired by traditional or vernacular forms, in which the notions of social, cultural and spatial, spatial, physical, technological and aesthetic factors are combined into a complex definition [30]

The aesthetic impact seeking a relationship with the creation of a sustainable architecture can be seen in the example of the building of the Museum of Modern Art in Bolzano. This study provides a solution to hide and reduce the use of different Internet cables, telephones and satellite dishes.

L'impact esthétique cherchant une relation avec la création d'une architecture durable s'illustre dans l'exemple du bâtiment du Musée d'art moderne de Bolzano.

Nous présentons dans cette étude une solution pour masquer et réduire l'utilisation de différents câbles Internet, téléphones et antennes paraboliques.

- The concept of "technological aesthetics" is achieved by the conscious application of the potential of modern technologies and by the beauty of a functional dimension shaped by new means. This beauty is consistent with the concept of sustainable development. The building of the Bolzano Museum of Modern Art seems to have such qualities [31].
- Typical elements of modern facades:
  - New materials,
  - Double skin facades,
  - Solar protection systems

The ROF technique, a facade solution respecting the traditional local environment

Principle of fiber radio technology

"To extend the geographic coverage of radio frequency signals and to meet the ever-increasing demand for high bandwidth, the proposed solution was to create hybrid systems combining fiber optic and radio technologies commonly referred to as" fiber-over-radio systems "(RoF)" [32]. By definition, the RoF is dedicated to the optical transmission of analog microwave signals. As a result, RoF Link is exploiting the efficiency of optical fiber for the distribution of radio signals to multiple wireless access points offering the benefits of mobility. Instead of distributing digital signals such as Ethernet (IEEE 802.11ad) or HDMI (WirelessHD) to communicate between each access point, which requires signal processing processes such as analog/digital and digital signal conversions. RoF systems distribute the radio signals in their original analog format.

Advantages of Rof Systems:

- Immunity to electromagnetic interference.
- Immunity to the use of cables. This is an underground facility.
- Energy efficiency: The RoF network allows the deployment of smaller radio cells with a better LOS (Line Of Sight) link, reducing the level of transmission and power required in the station and the power required in the base station. In addition, the low power consumption of the E/O modules and O/E Transducers.
- Reduced installation cost: The use of RoF systems has the advantage of centralizing different signal processing functions in the central station (CS), which simplifies the structure of the base stations (BS, Base) , and therefore the cost of the system.

Thesimulation

The development of fiber optic telecommunications has multiplied network architectures. The design of the associated systems is an increasingly complex problem because the number of parameters that affect the performance of the link is important. In addition, they must both have increasingly important information capabilities and renew themselves very quickly. Simulation software for optical transmission systems can help design and decision-making, while avoiding the multiplication of experimental tests that are both complicated and costly in terms of time and money. They allow taking into account the technological improvements of the components.

Simulation under Optisystem is a design software; to test and optimize any type of optical link in the physical layer of a broad spectrum of optical networks (MAN and WAN).

Data transmission by radio on fiber

We will now present how such a system can be used to transport binary data from the control station to the mobile station via a base station.

Application

In order to realize the ROF system, a DL laser source was used to generate an optical wave at 1550nm. A 10 GHz RF carrier frequency is used to modulate a pseudo-random NRZ

binary signal at a rate of 12.5Gbit/s. This sequence will modulate the generated optical wave. The RF modulation used is AM amplitude modulation.

a. *Internal modulation:* the RF signal is first modulated directly on the current supplying the diode. An electrical bias (driver) is placed before the laser diode.

b. *External modulation*: in a second step, an external modulator Mach-Zehnder is used to modulate the optical wave by the RF signal.

Then, the modulated optical signal will be transmitted through a 50km long SMF fiber with an attenuation of 0.2dB/km. On reception, a PIN photodiode detects this optical signal and converts it into an electrical signal. A low bandwidth filter centered around 10GHz is used to filter the RF signal. The latter will be amplified using an amplifier and later, it will be demodulated using an AM demodulator to recover the signal from the computer.

Interpretation of the results

1st Test. The spectrum of the optical signal after modulation is shown in figure 4. Part (a) represents the case of a direct modulation. On the other hand, the case of an external modulation is represented in part (b). In both cases, we note a frequency that we call (Fc) centered between two frequencies that take the values (Fc - FRF) and (Fc + FRF) with:

- Fc: modulated optical frequency.
- FRF: 10GHz RF frequency.
- Harmonic frequencies

According to figure 5, it can be seen that the optical spectrum resulting from an external modulation is brighter than that of a direct modulation. This result in insensitivity to the noise of the external modulation compared to the direct modulation. After detection, an RF signal centered on the frequency of 10GHz is obtained. The RF spectrum is shown in figure 5.

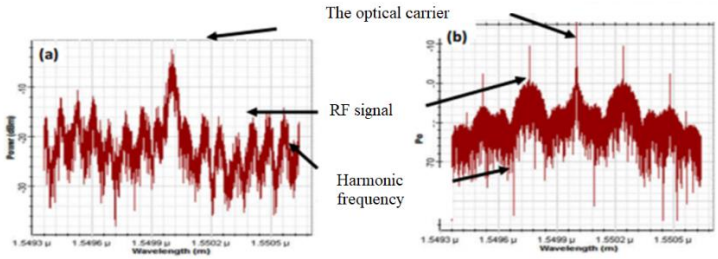


Fig. 4. Optical spectrum after modulation:
(a) Optical spectrum after direct modulation, (b) Optical spectrum after external modulation

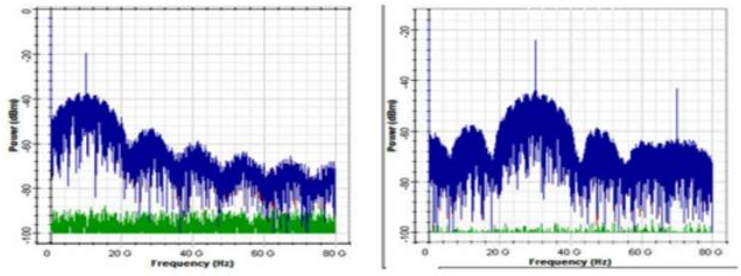


Fig. 5. RF spectrum after detection: (a) the RF spectrum in the case of a direct modulation,
(b) the RF spectrum in the case of an external modulation

Effect of data rate variation (Fig. 6) shows the eye diagrams for different signal transmission rates in the case of direct modulation. Note that for a rate of 10Gbit/s, the eye diagram is a bit noisy but remains open and the BER is less than 10^{-9} in both cases.

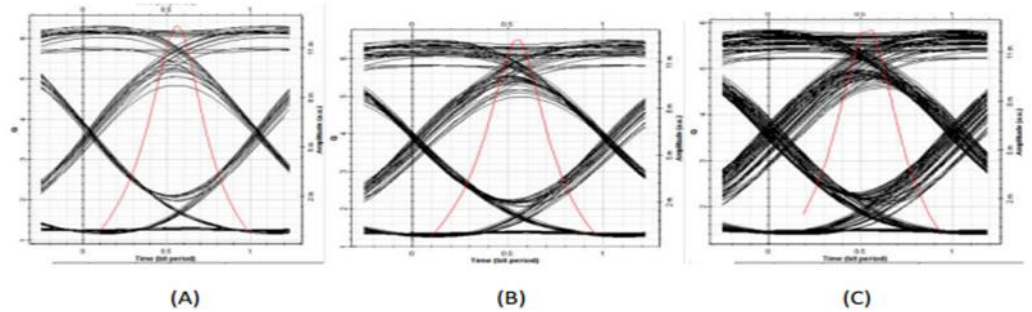


Fig. 6. Diagram of the eye propagated at 10 GHz (case of direct modulation). Source authors (A) bit rate: 2.5 Gbit/s, (B) bit rate: 5 Gbit/s, (C) bit rate: 10 Gbit/s

Figure 13 shows the diagrams of the eye for the same conditions as those mentioned above, but in the case of external modulation. We note a BER below 10-10 in both cases, but the results for 2.5Gbit/s are more efficient.

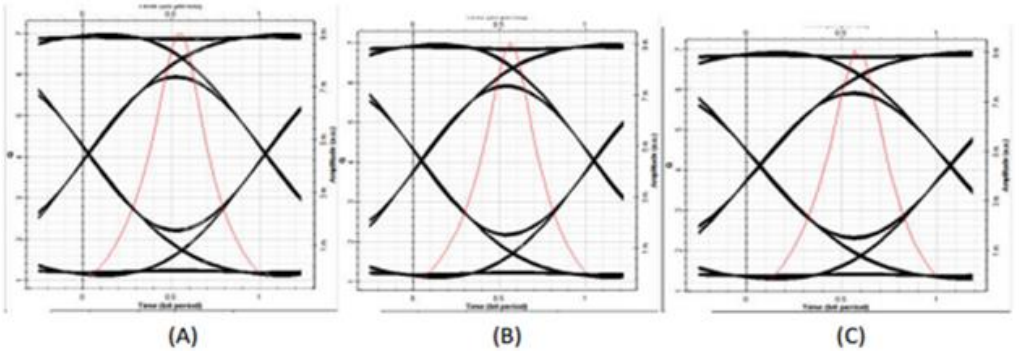


Fig. 7. Diagram of the eye propagated at 10GHz (case of external modulation):
(A) bit rate 2.5Gbit/s, (B) bit rate 5Gbit/s, (C) bit rate 10Gbit/s

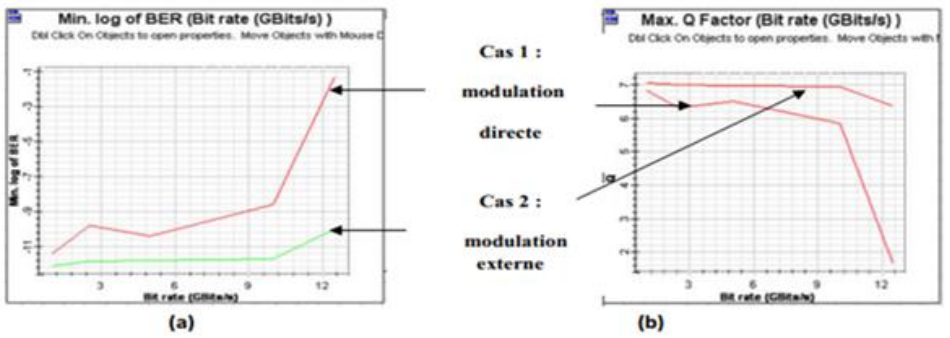


Fig. 8. BER and quality factor versus flow: (a) BER as a function of flow,
(b) Quality factor versus flow, source authors

We will then present the results of the BER and the quality factor by varying the bit rate according to the following values: 1Gbit/s, 2.5Gbit/s, 5Gbit/s, 10Gbit/s and 12.5Gbit/s.

Interpretation

2nd Test. Rates of 1 to 10Gbit/s: in the case of direct modulation, there is an increase in the BER but it is always less than 10^{-9} with a decrease in the quality factor which remains greater than "6". In the second case, the values are almost constant; a low BER (less than 10 - 11) with a good quality factor "7". Bit rates greater than 10Gbit/s: in the first case, we observe a sharp increase in the bit error rate with a sharp decrease in the quality factor. For the second, the BER increases with flow rates, but remains below 10^{-9} and we also note a decrease in the quality factor but remains above "6". These results lead to conclude that the direct modulation cannot be used beyond 10Gbit/s and presents performances inferior to the external modulation.

In this part, the objective is to simulate a fiber-based radio network that involves the transmission of 2 radiofrequency (RF) signals via a bidirectional optical fiber at a wavelength of 1550nm, a length of 50km and an attenuation of 0.2dB. We combined two RF signals: we obtained the same results as during the first test thanks to the important passage of fiber bung.

Results and Discussions

Advantages of vernacular architecture

Vernicular architecture presents three advantages [33]:

- Ecologically sustainable: no corrugated metal roofing sheets or wooden beams.
- Durable: it has been lived for VII century.
- Comfortable thermally and acoustically.
- Economically viable: only locally available raw materials (earth, stone, wood and water)
- Modular: applicable to a wide variety of buildings.

Result of the comparison with the traditional model

Tradition is a priori subject to the new demands of cultural, economic and social systems. The traditional habitat in Ksar de Bechar is devolved to a transformative and revealing action of a new architectural language. The analysis of the modes of appropriation and their representations, as well as social practices, shows a system of expressions of the inhabitant in search of a balance with his dwelling in relation to his personal image. In a cultural confrontation between tradition and modernity, the inhabitant transforms his living space to create a new way of life that attracts the sociocultural values incarnated between this duality. For *A. Rappoport* [15] "The construction of a house is a cultural phenomenon, its shape and layout are strongly influenced by the environment to which it belongs" [34-35]. But these internal transformations have, on the one hand, improved the living conditions of the inhabitants (in the face of problems of comfort, humidity, deterioration of walls and ceilings, etc). But on the other hand, they contribute to the degradation of this heritage and the disappearance of its architectural and historical value due to the lack of know-how and appropriation by involving new materials incompatible with the old (cement that replaces lime, cinderblock instead of stone). *Khalil Gibran* emphasizes in his article "the processes of transformation" that transformations "lead to an acceleration of the wear of buildings, sometimes to dangerous failures and to a heritage in peril and to its architectural values, thus to its survival" [38] manifested at the level of the facades.

Simulation result

We have demonstrated that this technique improves throughput and meets the accelerating demand for high-speed wireless services by users and the limitation of bandwidth in terms of bandwidth and unlicensed bandwidths, naturally leading to the transition to the 60 GHz centered millimeter band, with very high bandwidth and high bandwidth. In addition, the miniaturization of millimeter opens the door to the development of circuits allowing the integration of antennas in radio receivers. However, the radio coverage for these frequencies is very limited, hence the need to integrate analog optical links to extend the wireless network

with reliability and efficiency. The variation of the transmission quality as a function of the length of the bidirectional fiber and the bit rate of the link has been studied in this simulation. In addition, some cases have been tested: direct optical modulation and external modulation. Direct modulation is suitable for systems that do not require very high speed, as well as external modulation that displays broadband performance.

Causes of the facade disfiguration are summarized in the table below

Table 3. The causes of the facade transformation

Front	Pattern	Picture
Opening of commercial premises in the main street	Benefit from a commercial facade The different activities of the inhabitants	
Cover of the courtyard	Need space	
Reformulation of the domestic space by the creation of a duplicated floor of the ground floor	AEP network, sanitation, gas	
		
Internet wiring, telephone, Electrical installation, television and satellite dish	Modernization and development of communication	

Thanks to this technology, we reduce the wires that deform the urban interfaces by the inconsiderate use of the protruding elements in the facade: cable of telephone, Internet, television, with a single cable penetrating directly in the house without modifying the interface can be obtained communication services [5] (television, internet, radio, telephone, and parable).

Conclusion

This paper shows a dual relationship between vernacular know-how and contemporary technology, as well as its influence on the landscape in a changing world. He emphasizes the importance of landscape image and how it can contribute to sustainable development with an aesthetic appearance.

In the contemporary era, vernacular language is not really traditional, while the contemporary landscape faces many environmental impact challenges.

Vernacular production boasts of forms whose symptoms emanate and respond to both local climatic conditions materials and in situ cultures. Subsequently, vernacular language is able to forge links between collective memory, local culture, residential spaces and time. To respect tradition then, architectural productions must be protected from the destructive results of a chaotic and ever-increasing development. Some of their features could be developed with resilient solutions and strategies.

The comparison of vernacular and contemporary houses in Bechar shows that vernacular houses could offer a higher level of comfort by using building design strategies influenced by external environmental conditions. Today, thanks to advances in technology, homes are built faster than before. We can enjoy and manage the technology the right way, while the benefits of insulated roofs, walls, floors, double glazed windows, materials, earthquake resistant structure, weather factors and all other technical installations the use of the cables and the satellite dish on the front should be appropriately used. This document could be considered as a guideline for architects and designers, but it is clear that further research and studies on the precise and appropriate use of existing technologies in each region are needed and could be researched in this area.

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