

WIFI HOT SPOT SUPERDISTRIBUTION - A PROFIT SCHEME FOR WIFI ACCESS DISTRIBUTION

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Abstract

The wide-area deployment of WiFi hot spots challenges IP access providers. While new profit models are sought after by them, profitability as well as logistics for large-scale deployment of 802.11 wireless technology are still to be proven. Expenditure for hardware, locations, maintenance, connectivity, marketing, billing and customer care must be considered. Even for large carriers with infrastructure, the deployment of a large-scale WiFi infrastructure may be risky.

This paper proposes a multi-level scheme for hot spot distribution and customer acquisition that reduces financial risk, cost of marketing and cost of maintenance for the large-scale deployment of WiFi hot spots.

Keywords: wireless, hot spot, DSL, superdistribution, profit.

1 INTRODUCTION

The deployment of wide-area WiFi hot spot networks challenges internet access providers, cellular carriers and telecommunications analysts. T-Mobile, Voicestream and other operators test-market WiFi networks in major towns, airports, railway stations and coffee places. Still, the commercial value of WiFi hot spot operation is unclear, as the technology is rather new, and compared to cellular networks with their improving data speeds, looks like a piece of patchwork. In **Fehler! Verweisquelle konnte nicht gefunden werden.**, the GSM coverage of T-Mobile in west Germany is shown.

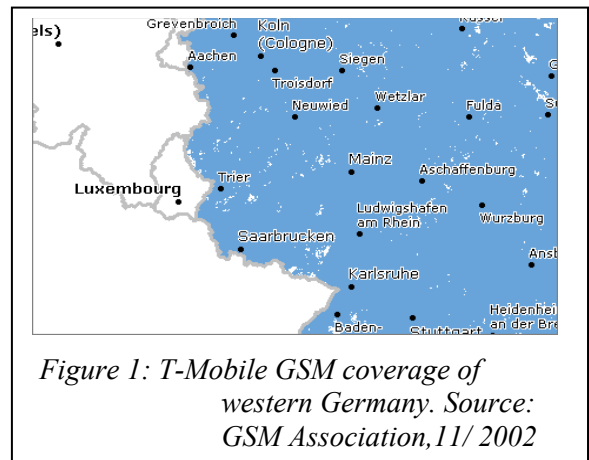


Figure 1: T-Mobile GSM coverage of western Germany. Source: GSM Association, 11/ 2002

In contrast, Figure 5 shows that only a total of 34 identifiable commercial WiFi access points provided by four different operators were available in September 2003 in Frankfurt am Main, Germany’s banking and business capital. Telecommunications providers, mobile operators, internet access firms and retail chains act as WiFi access providers. Currently, high-traffic locations frequented by business people are considered “hot spots” for access point deployment. Such locations are airport lounges, railway station lounges, chic coffee places and restaurants in business districts. Among the 115 identified APs in Figure 2, only a minority of APs was found to be publicly available commercial hot spots.

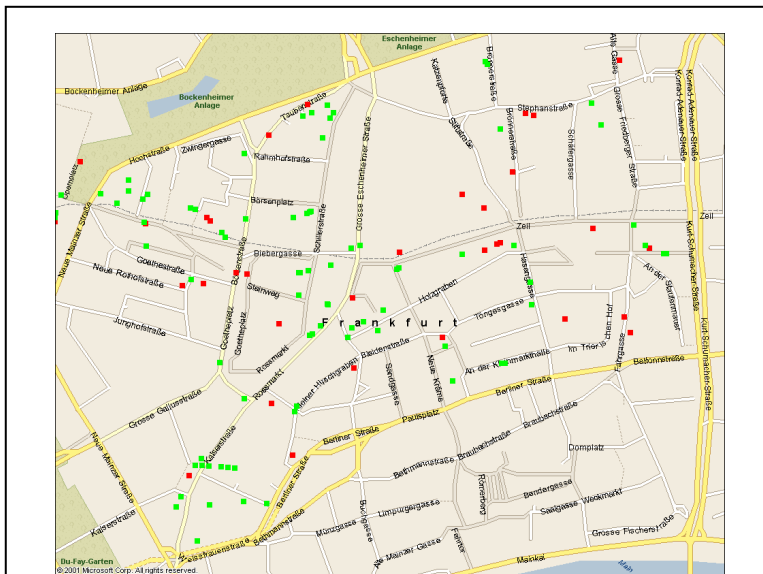


Figure 2: APs in Frankfurt's business district as of Sep.3, 2003. Red markers: WEP encrypted. Green markers: unencrypted access. . Source: [1].

Reasons and hindrances for the slow growth in WiFi hot spots have been identified in [1]. Among them, as challenges for WiFi deployment were found:

- The need for a distinguishable product;
- the lack of ubiquitous access;
- bandwidth restrictions with growing user numbers;
- lack of unified authentication and billing;
- the low number of customers equipped with WiFi devices;
- and the cost of infrastructure deployment.

Therefore, a different deployment scheme for WiFi hot spots is worth a closer look: hot spot superdistribution, where hot spots are operated and maintained by partners in a multi-level-marketing scheme.

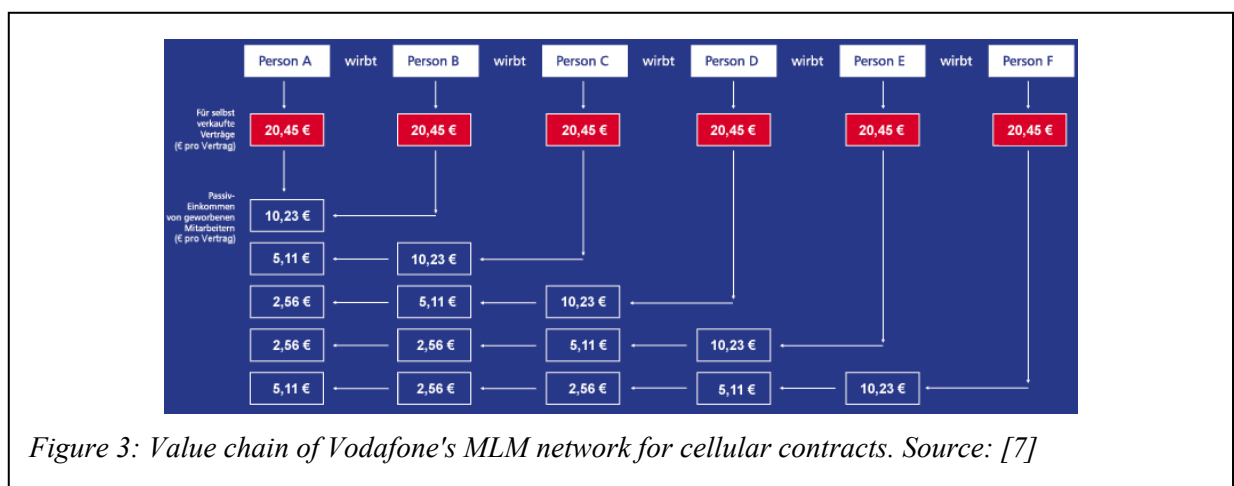
1.1 State of the art in technology

While operators currently target prospective high-traffic locations, research investigates the use of large-scale, wide-area deployment of WiFi technology and its business models. Work in the field includes:

- Mobility support and roaming for 802.11 connected devices from one access point to another [e.g. RFC2002 and consecutive RFCs, at <http://www.faqs.org/rfcs/rfc2002.html>]
- Localized services based on access point location, e.g. at Frankfurt’s hot spot operator Mainsurf’s access points
- Location based services (indoors or outdoors) based on a network of access points and their locations [2]
- UMTS-to-WiFi handover to provide large bandwidth when needed [3]

1.2 State of multi-level-marketing in telecommunications

Generally, multi level marketing (MLM) has a bad reputation due to its hard-to-distinguish proximity to fraudulent pyramid schemes. MLM is based upon a network of reputation each independent salesperson creates to sell products and the MLM business model into. The difference between regular sales and MLM (or “network marketing”) is the opportunity for the “downline”¹ consumers to engage in selling and products and business model, too. This constitutes a pyramid-shaped distribution and



profit-sharing network, where the “downliners” share a fraction of their profits with the “upliners” who opened the network for them. MLM is legal, pyramid schemes are fraud and usually illegal. A good distinction between them is made by the Attorney General of Idaho, United States, in [4]. Some of MLM’s bad reputation is a result of sect-like recruiting and motivational seminar organizations appearing with MLM, as described in [5].

While there are many long-time MLM organizations for consumer goods, e.g. the Amway distribution network or Tupperware, the selling of telecommunications products and services through MLM is a recent phenomenon on the market. In 1999, [6] found that among the feasible products for MLM, complex and innovative telecommunications services to be underrepresented.

¹ “downline” refers to sales agents recruited by a particular agent, thus working “under” him. “upline” refers to agents who are on higher hierarchical levels.

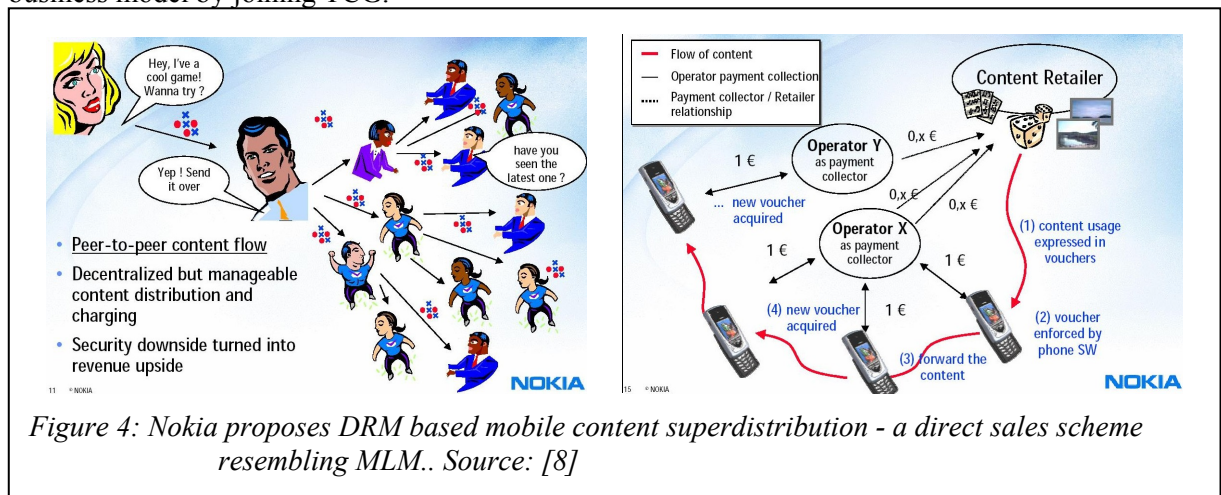
Three schemes are presented in this section to illustrate the state of MLM development in telecommunications.

1.2.1 *Vodafone direkt*

Vodafone adopted a MLM distribution scheme for cellular phone service contracts in Germany in 2003. The network sells cellular contracts and prepaid cards. Revenue sharing is a simple-to-understand profit sharing scheme, restricted to 6 levels of depth. Participants in the network sell contracts or recruit new participants, whose profits they share. Sharing only happens for activation fees for the cellular contracts, while Vodafone earns profits from basic fees and telecommunications service used by the customers. Figure 3 shows the profit chain.

1.2.2 *Nokia superdistribution of digital content*

Nokia proposed a digital rights management system (DRM) in 2001. The so-called “superdistribution” of multimedia content on mobile terminals like cellular phones is thought to create new profit schemes for telecommunications operators, content owners, and Nokia. Relying on copyright management infrastructures, rights and profit clearing centres and finally, trusted hardware on mobile terminals, Nokia standardized DRM for mobile content within OMA, and is thought to further implement the business model by joining TCG.



The idea of mobile content superdistribution is the passing-on of copyrighted media pieces in a peer-to-peer manner from one person’s mobile device to another person’s mobile device. The receiving device can detect the copyright with its DRM system, and ask the user whether he wants to buy a licence. If the user agrees, a licence voucher is obtained online from a clearing party, e.g. a cellular operator who has a contract with the content retailers. The actual “selling” of content is done by the cellular operator’s customers. Adding the missing profit “upline” from passer-ons to the original distributor would complete a MLM-scheme (see Figure 4).

1.2.3 *Q-DSL MLM scheme*

QSC DSL subscriber lines are advertised in a German MLM scheme [9] by Net communications AG. In a simple MLM scheme, a direct sale of a DSL subscription generates 75 € bonus for the selling agent. If the agent acquires new agents, he receives 25€ from each agent’s DSL sale.

2 STATE OF WIFI NETWORKS IN A MAJOR TOWN: FRANKFURT AM MAIN

To verify the spread of WiFi access points across a major town, we have chosen Frankfurt am Main, Germany, as our measuring grounds. Frankfurt is the banking capital of Germany, and due to its economic composition has a very dense telecommunications infrastructure. Banks, consulting firms, software industry and chemical industry are present in town. In a measuring campaign from June to September 2003, two selected districts in Frankfurt have been searched with 802.11 detection equipment and recorded along with GPS positions. Repeated measuring took place in a housing & small business area (Westend) and in the main business district (Zeil). Table 1 and Figure 5 summarize the results [1].

The number of AP's in Westend was stable, towards the end of the campaign, while the number of AP's in the business district kept growing. Thomas Lindner found that the commercial hot spot operators' efforts mainly increased the number of AP's in the business district.

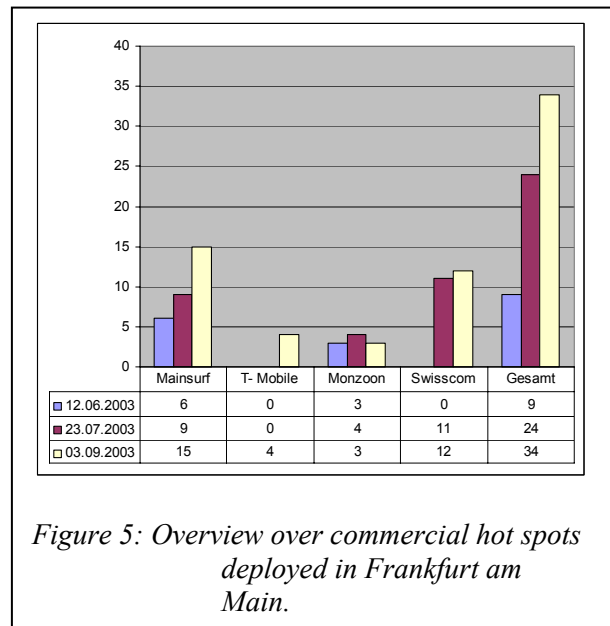


Figure 5: Overview over commercial hot spots deployed in Frankfurt am Main.

Date	Westend	Zeil	Total
13.06.2003	97 APs	45 APs	142 APs
23.07.2003	120 APs	77 APs	197 APs
03.09.2003	120 APs	115 APs	235 APs

Table 1: Changes in the Number of APs

The figures and numbers suggest that the majority of detected APs belong to private persons or businesses, operated for their own sake. Only 34 of 235 APs were identified as commercial WiFi providers. Thus, the resulting potential for WiFi service in Frankfurt is much greater than 34 hot spots. The problem may be the deployment of a network of APs, for which a solution is suggested in the following section.

3 WIFI HOT SPOT SUPERDISTRIBUTION

3.1 The concept

Two preconditions are made to illustrate the concept. We assume the ongoing installation of DSL subscriber lines, e.g. by the German Telekom, can be used as a base for hot spot installation. The second assumption is the availability of accounting, billing and clearing for IP access of subscribers, e.g. by a popular provider like T-Online, or a mobile operator like T-Mobile.

The concept of WiFi superdistribution is sketched in three sections: sales organization, regulatory advantages, and financial advantages.

3.1.1 Sales organization

MLM relies on independent agents. Agents sell a product themselves and keep a percentage of the profit. Usually, an agent’s consumption of products is added to the profit figures, too. Additionally, revenue is generated by recruiting new agents for the MLM organization, resulting in bonus payments on the newly recruited agent’s turnaround. The resulting hierarchies grow over several levels, paying percentages to the upper levels. The most important difference towards a regular salesman is the revenue generated by recruiting new agents and sharing percentages of their profits. A detailed explanation of revenue sharing, bonus payments and recruiting can be found in [10].

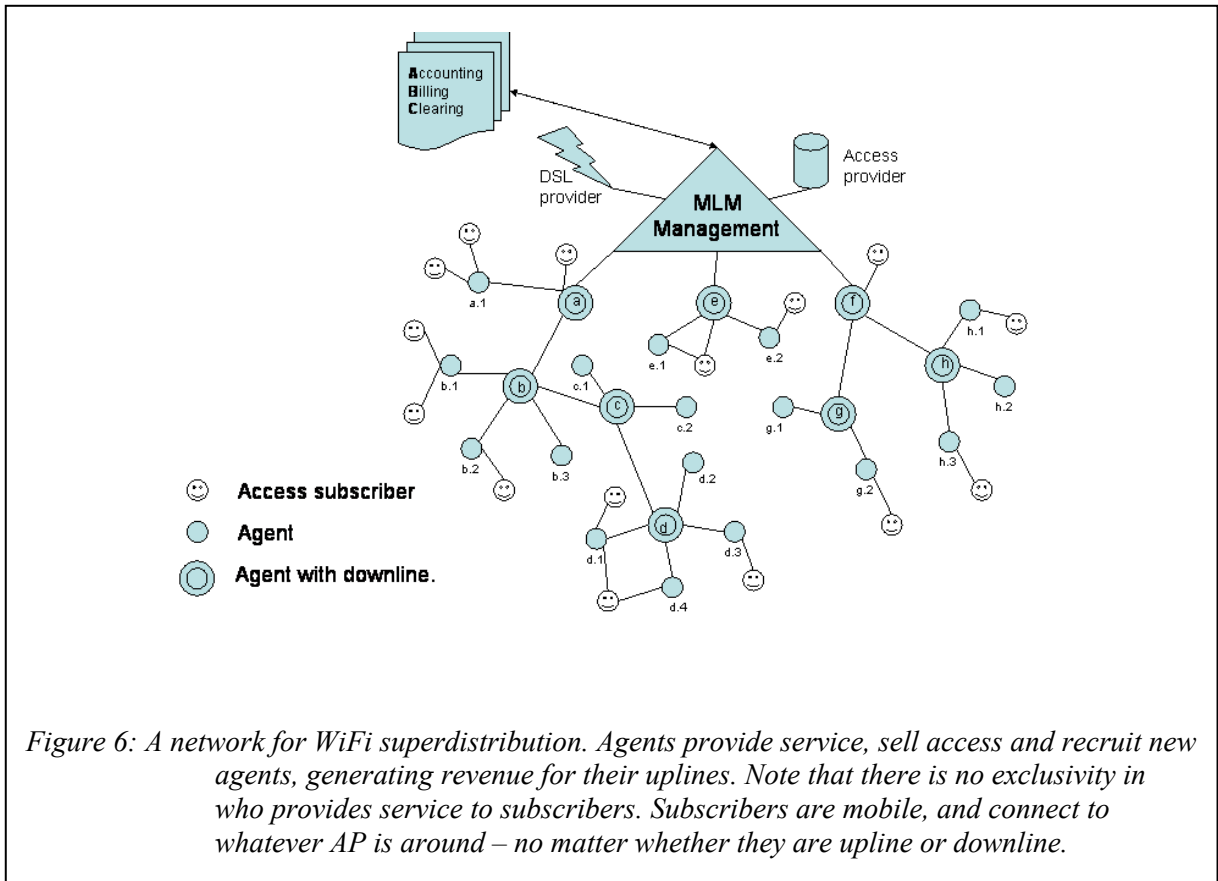
The upcoming MLM schemes in telecommunications mentioned in section 1.2 pay fixed bonuses for a sale. These schemes either sell copies of digital content, or subscriptions to telecommunications service. After the sale, the agent is not involved into providing and billing the services.

The model in this paper proposes a scheme where agents provide WiFi access, acquire new subscribers and new agents. Subscribers using an agent’s hot spot also use his bandwidth, lowering the agent’s quality of service. Thus, the agent must retrieve revenue from this usage of his bandwidth. Revenue is generated in 4 ways:

Revenue sources	DSL subscriptions	WiFi Hotspot	Access subscriptions	Agent recruitment
Sales target	Acquire new DSL line subscribers, e.g. for Deutsche Telekom.	Provide service to WiFi users with access subscription.	Sell access subscriptions or prepaid cards for WiFi access, e.g. with T-Online.	Recruit agents to provide WiFi hot spots and sell DSL / access.
Revenue type	One-time sales bonus	Service fee bonus based on used bandwidth / time	One-time sales bonus	“downline” revenue share from one-time and service payments.

Table 2: The 4 ways of revenue generation in MLM SDL/WiFi superdistribution scheme.

For simplicity, it is assumed there are no agents without a WiFi hot spot. Also, there is no continuous revenue generated from selling DSL subscriptions. An example network of agents is shown in **Fehler! Verweisquelle konnte nicht gefunden werden.** Agents who successfully recruited other agents (letters a through h) receive revenues from their downlines. Leaf nodes in the graph, e.g. agents a.1 or d.4 do not have downlines, earning revenue from subscription sales and WiFi service.



On the other hand, DSL lines as well as a WiFi hot spots both support limited bandwidth. The bandwidth of a hot spot (5-8 mbit/s) is shared among all users. DSL lines typically have a bandwidth range from 368kbit/s up to several mbit/s. An agent thus has limited revenues to make from selling bandwidth and accounts. His only way to increase profits is to recruit other agents the receive shares of their profits. This results in a high motivation to market the concept of recruitment. A fallback for overcrowded hot spots combined with lazy or incapable agents is network management. The operator can accumulate the traffic and users on each hot spot by means of network management protocols, and initiate motivational or marketing campaigns if demand exceeds bandwidth in particular areas.

As the WiFi infrastructure generates revenue, each agent is motivated to care for uninterrupted availability of the hot spot. Simple failures can be avoided by redundancy in hardware, e.g. double WLAN interfaces on each hot spot. Failures of the DSL line are beyond the agent’s influence and thus the responsibility of the operator.

4 SOME CONCERNS ABOUT MLM

After showing the opportunities of MLM in telecommunications, some topics about the downside of MLM organizations have to be discussed. First, telecommunications According to [10], some MLM specific risks are:

1. The loss of control and steering in agent networks
2. Conflicting interests concerning other distribution channels and their profits
3. Confusion of customers due to the availability of identical products on different channels
4. High fluctuation in active agents

These concerns can be tackled using leadership techniques described in [10] and product differentiation described in [6]. Possible solutions towards the respective problems are:

1. Non-monetary rewards like honour medals, “high sales club” memberships and other status elevating rewards to set role models for agents.
2. Balancing the marketing mix and sales channels towards the market requirements
3. Offering product flavours to the market that are not available elsewhere, e.g. bundling a free WiFi access point with the DSL subscription for new customers.
4. Create agent support structures, e.g. training, motivation and leadership schemes.

5 SUMMARY

The MLM approach can particularly benefit small players on the market or players that deploy fixed-wire internet access like DSL. Bundling DSL with MLM and WiFi hardware, a network of hot spots grows with the demand for DSL and WiFi access. The main advantages are summarized in the following sections.

5.1.1 *Product and services bundling*

Positive effects of combined WiFi and GSM services are expected to enter the market. A location based service can either guide users to a nearby hot spot when they need data bandwidth, or hot spots with known locations could become a source of location based services by themselves. The first case is called “cellular-to-WiFi handoff” in [3] and expected to create net effects for both the cellular and WiFi market in [11].

The latter is examined and a business model proposed in [1].

5.1.2 *Regulatory advantages*

WiFi access point operation requires registration with regulatory authorities in many countries. Depending on the contracts with agents, agents could be hired as independent businesses, therefore overseeing responsibility for regulatory requirements for their hot spots.

Independent agent businesses may have advantages concealing exposure of a network operator towards protest groups. Some groups and initiatives concerned with “electro smog” and electronic pollution may target hot spots as neighbourhood-polluting sources of electromagnetic fields. Hot spots operated by independent agents are harder to locate and attribute to a particular operator, thus causing less exposure to protest and environmental movements for the DSL or network operator.

5.1.3 *Financial advantages*

- Reduced financial investment due to a DSL/Access subscription sold with every WiFi AP provided.
- Payments to sales force based solely upon their revenue
- Growth of WiFi coverage in line with demand
- Technical service (e.g. replacement of defective AP) cared for by agent by service level agreement and redundant hardware.

As a summary, the deployment of hot spots using multi level marketing techniques seems an appropriate means of reducing financial risks for rolling out a large infrastructure with an unclear

future. MLM profit schemes, de-centralized marketing the agents' personal share create a base for wide spread of WiFi hot spots.

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