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TURNOVER/OUTPUT MEASURES IN THE TELECOMMUNICATION INDUSTRY IN NORWAY

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1. Definition of the service being collected

The current Norwegian standard of industrial classification is called SN2002. It is based on NACE rev. 1.1, which is derived from ISIC.

According to NACE rev. 1.1 (ISIC rev. 3.1), postal and telecommunication activities are coded together in NACE 64. The telecommunication service industry has code 64.20 with no further subdivision. SN2002, however, is subdivided to meet national needs – see Table 1.

Table 1. Telecommunication activities, NACE rev. 1.1 and SN2002

NACE rev. 1.1 (ISIC rev. 3.1)	Activities	SN2002	Activities
64	Post and telecommunications	64	Post and telecommunications
64.2	Telecommunications	64.2	Telecommunications
64.20	Telecommunications	64.21	Fixed telecommunication activities
		64.22	Mobile telecommunication activities
		64.23	Internet service activities
		64.24	Other telecommunication activities

Table 2 shows the last version of the national classification, SN2007. It is identical to the new industrial classifications NACE rev. 2 and ISIC rev. 4. The transition to SN2007 will begin in 2009.

Table 2. Telecommunication activities, NACE rev. 2 and SN2007

NACE rev.2 (ISIC rev. 4)	SN2007	Activities
61	61	Telecommunications
61.1	61.1	Wired telecommunications activities
61.2	61.2	Wireless telecommunications activities
61.3	61.3	Satellite telecommunications activities
61.9	61.9	Other telecommunication activities

The remainder of this paper will in general refer to SN2002 (NACE rev. 1.1).

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The transition to new classification standard SN2007 will be carried out in accordance with requirements from Eurostat and the national accounts. All short-term statistics will be published according to the new standard from January 2009 onwards, with back-casting of time series to January 2000. For the telecommunication industry Statistics Norway produces statistical information on the following:

Structural business statistics (SBS)
These annual statistics include figures on enterprises, employees and turnover, to mention some variables. The published time series go back to year 2002 (some are from 1999), and currently these statistics are broken down into SN2002 four-digit categories. Turnover data is based on data from administrative registers.

Statistics released from year 2009 onwards will be published according to the new standard, SN2007, with back-casting of time series to 2007. Statistics with 2008 as reference year will be published according to both the new and the old classification standard.

Turnover index (STS)
Short-term statistics with time series for turnover published quarterly since the first quarter of 2003. Series are available for three-digit level industry, 64.2 Telecommunications, and the data source is the Value Added Tax Register.

Service Producer Price index
Quarterly price statistics for telecommunication services with series starting in the 4th quarter of 2005. The statistics are published at three-digit level, 64.2 Telecommunication, and cover services offered to private households and the business market. The price index is a sample survey.

National accounts
Quarterly series go back to 1978 and annual series to 1970. The national accounts give a structured overview of supply and use of products in the economy measured in both current and constant prices. Currently, series are published at two-digit industry level, 64 (SN2002), where the telecommunication industry is grouped together with the postal industry.

The annual national accounts for 2009 will be published according to SN2007 in 2011. From the 3rd quarter of 2011 the new classification will also be used in the dissemination of quarterly figures.

Wage statistics
These annual statistics give figures on average monthly earnings and average basic monthly salary at three-digit level, 64.3 Telecommunications (SN2002). Figures by age-group, sex, educational level and occupational group are published for the ICT sector as a whole. The time series go back to 1999. The transition to SN2007 will follow the same procedure as outlined above for the SBS.

Statistics Norway also produces statistics on use of ICT in households, enterprises, public administration, municipalities and county municipalities. The Internet Survey gives detailed regional information about the infrastructure that establishes access to the internet for businesses and private individuals in Norway.

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2. Unit of measure to be collected

Turnover from the SBS survey and the turnover index is in NOK and is defined as the sum of remuneration for rendering services to customers, sales of merchandise and gross income from other activities. Rental income and commissions are included, while special taxes, public grants and profit on the disposal of fixed assets are not. VAT is not included in the statistics.

3. Market conditions and constraints

The telecommunication industry has been characterized by a strong growth since the early 1990s. In 1993 the industry monopoly was phased out and telecommunication services were fully liberalized in 1998. The result of this has been a market with growing number of companies and stronger competition, high technological progress, and new products and services. In addition, many activities have been merged and this has made it more difficult to isolate the services and measure movements in prices and turnover figures.

From duopoly to an open market in mobile telecommunications
Since 2002, the traffic volume in fixed telephony has decreased, partly because of the introduction of broadband internet and phone services. In previous years private households' use of internet was dependent on dial-up connection through fixed lines.

Along with this, fixed phones have been replaced by use of mobile phones. The mobile telecommunications market used to be a duopoly where two large enterprises managed and owned their own networks. After a legal amendment in 2000 reselling in the two networks became possible, and nearly 20 mobile operators were established. This resulted in saturation in the market for mobile subscriptions. The growth in the sector can thus be explained by the introduction of new services (cf. SA 98).

A few dominating enterprises
In spite of the fact that the telecommunication industry in Norway has experienced growth in the number of actors, the industry is still dominated by a few large enterprises. Table 3 shows that the larger amount of actors is caused by the founding of small enterprises with less than 10 employees.

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Table 3. Number of enterprises by employments group, 1999-2006*

	Number of enterprises							
	0-1 employed	2-4 employed	5-9 employed	10-19 employed	20-49 employed	50-249 employed	250 or more employed	Total
1999	131	51	24	17	11	16	9	259
2000	156	55	28	20	16	16	10	301
2001	179	42	34	30	28	21	11	345
2002	233	53	45	28	28	26	9	422
2003	290	56	43	30	28	27	6	480
2004	329	76	50	32	29	27	7	550
2005	398	88	51	30	31	25	5	628
2006	418	114	61	37	36	24	7	697

*Structural business statistics

Table 4 shows the movements in number of local KAUs and persons employed, and turnover from 1999 to 2006. The number of local KAUs increased in this period. The number of persons employed grew from 1999 to 2002, but from 2003 to 2006 it gradually declined. Although turnover fluctuated in the first few years of the period, overall it increased by 28.4 percent from 1999 to 2006. This corresponds to an average annual growth of 4 percent.

Table 4. Number of local KAU, persons employed and turnover, 1999-2006*

	Local KAU	Persons employed	Turnover (mill. NOK**)
1999	369	10 737	46 976
2000	428	12 106	51 847
2001	481	13 428	47 902
2002	566	13 546	52 342
2003	636	13 168	55 542
2004	715	12 894	58 115
2005	777	12 562	56 619
2006	863	12 775	60 331

*Structural business statistics
**1 Euro = ca 8 NOK

In Table 5, the share of local KAUs, persons employed and turnover in 2006 is listed by SN2002 four-digit activity code.

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Table 5. Number of local KAUs, persons employed and turnover on four-digit code. 2006*

	Local KAU	Persons employed	Turnover (mill. NOK**)
Total	863	12 775	60 331
64.21 Fixed telecommunication activities (carriers)	117	6 123	18 813
64.22 Mobile telecommunication activities (carriers)	62	2 009	24 632
64.23 Internet service provideres	127	965	2 785
64.24 Other telecommunication activities	557	3 678	14 102

*Structural business statistics
**1 Euro = ca 8 NOK

Barriers to entry in the telecommunication service

Some of the telecommunication activities (carrier services) require capital and network access in order to enter. The number of new enterprises reached 200 in 2005, up approximately 50 per cent from 2004. We observe that new firms often can be classified somewhere between IT consulting services and general telecommunication services, in which case they are assigned to the category 64.24 *Other telecommunication activities* (SN2002). In the telecommunication service industry, the share of females in total employment is modest and stable at about 30 per cent (cf. SA 80). This is relatively low, compared to the economy as a whole.

The telecommunication industry can be defined as a "high technology" sector, and is dependent on skilled labour. In 2007, the average monthly earnings in the telecommunication industry in Norway (full-time employees) was NOK 42 074. By comparison, the average monthly earnings of full-time employees in the economy as a whole was NOK 33 387 (cf. Wage statistics).

Vertical and horizontal convergence

The telecommunication market has in recent years gone through convergence both vertically and horizontally. Vertical convergence can be understood as a weakening of the boundaries between telecommunication activities and activities in the media and IT. This means that previously unrelated products, like media content and local access, now to a larger extent can be considered as complementary. Horizontal convergence is a term that describes how networks, which originally were developed for specific user-areas, appear as substitutes according to their ability for transmitting digital information. This opens for competition between for example cable TV companies and traditional broadband providers.

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4. Standard classification structure and product detail/levels

The main standard classifications in use are NACE and CPA (Classification of Products by Activity). Product level details in CPA are derived from UN's classification, CPC (Central Product Classification). The telecommunication activities (CPA 2002 and 2008) are listed in the Appendix.

Table 6 shows products and their turnover from 2002 to 2006 in Norway. The collection of data on product turnover is carried out at a less detailed level than the CPA. In general, data on products are collected in the SBS survey on the local KAU level.

The figures in Table 6 differ from four-digit NACE (Table 5). This is caused by the fact that local KAUs are placed in the NACE code where the majority of value added is generated (e.g fixed telephony activities), but they often deliver other products, too (e.g mobile telephone services). Turnover from mobile telephone services will then be placed under fixed telephony activities on four-digit NACE.

Table 6. Turnover broken down by products. 2002-2006.* NOK million**

	2002	2003	2004	2005	2006
Total	**52 350**	**55 546**	**58 115**	**56 401**	**60 282**
Fixed telephony	19 408	18 533	13 663	12 591	9 222
Fixed IP telephony	N/A	N/A	N/A	329	756
Mobile telephone services	15 651	17 129	17 636	17 909	18 404
Internet services	3 808	4 548	7 126	5 635	5 892
Interconnection services	N/A	N/A	4 252	4 539	6 183
TV-Broadcasting	5 734	7 011	6 358	6 713	7 588
Other services	7 748	8 325	9 081	8 684	12 236

*Total turnover declined in the period 2004-2005. This was due to major reorganizations in one large telecommunication company.
**1 Euro = ca 8 NOK

Interconnection services (traffic-exchange between operators) were included in the survey in 2004. In 2006, the number of households who adopted IP telephony reached 360 000, a 50 per cent increase compared to 2005. IP telephony was therefore included in the survey in 2005. Fixed telephony declined by 52 per cent in the period 2002-2006, while mobile services increased by 18 per cent in the same period.

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5. Evaluation of standard vs. definition and market conditions

Since telecommunication services are produced by a variety of unit types, product data will be collected across industries. From Table 6 we see that the majority of the products seem to maintain their relevance throughout the period. This includes fixed telephony, mobile telephone services and internet services.

As is evident from Table 6, *Other services* had a large share of total turnover throughout the period. The lack of information on the content of this group complicates the monitoring. In the last years of the period a growth of some 50 per cent adds to the challenge. This increase can partly be explained by changes in satellite services. In an annual survey the enterprises are asked to provide detailed information on product contents. However, our experience is that they rarely do. This is a cause for concern since increasing residual categories can be interpreted as inadequate product breakdown, and we believe that a product category such as *Other Services* should be as small as possible. There are reasons to believe that the implementation of NACE rev 2 will result in a decrease in turnover for this category when satellite activities are classified separately in the new NACE 61.3.

Introduction of new products will be considered to complement the industry structure in NACE rev. 2.

6. National accounts concepts and measurement issues for the area related to GDP measurement

Telecommunication activities contribute about 2 per cent to the GDP of mainland Norway.

The annual national accounts are based on several different inputs produced by Statistics Norway, such as the Structural Business Statistics, accounting statistics for general government and enterprises, statistics for wages and earnings, external trade statistics, household consumer surveys and labour statistics. Some parts of the national accounts are constructed more or less directly from other statistics, while other parts are based on calculations and estimates. To some extent, data produced by external suppliers are used.

Output in the national accounts is valued at basic prices in the case of market production and production for own final use. Basic prices mean that corresponding taxes on products are deducted and subsidies on products are added to output recorded at producers' prices.

By large the output from the telecommunication industry follows turnover from the structural business statistics. Only a few adjustments are normally made, and deviations between output and turnover has never exceed 1 per cent. Output increased with 19.5 per cent from 1999 to 2005, according to Table 7. This growth figure is 1 per cent lower than the turnover figure obtained from the SBS in the same period of time (see Table 4).

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Table 7. Output and value added in the telecommunication industry. 1999-2005*. NOK**

	Output (basic value)	Intermediate consumption	Value added
1999	47 030	31 768	15 262
2000	51 342	37 670	13 672
2001	47 615	31 452	16 163
2002	52 216	32 194	20 022
2003	55 391	33 889	21 502
2004	57 601	35 761	21 840
2005	56 195	33 891	22 304

*National accounts
**1 Euro = ca 8 NOK

The deflation method is used to estimate the development in volume of output in the national accounts. The consumer price index has until now been used to remove the effects of price change. Statistics Norway has recently started publishing a producer price index for telecommunication services which includes the business market as well (see chapter 8).

7. Turnover/output data method(s) and criteria for choosing various output methods

Structural business statistics (SBS)
The primary source of turnover data is the annual SBS. The SBS combines a survey with data from administrative registers. The enterprises are asked to break down turnover by the product categories presented in Table 6. This information is not published, but it is used by the national accounts to provide more detailed data on the telecommunication industry.

Turnover index
The quarterly short-term statistics (STS) uses VAT sales value information as a basis for providing revenue estimates at industry group level. The STS survey does not allow a detailed breakdown of turnover figures. The purpose is first of all to serve as an indicator of the aggregate telecommunication cycle. The turnover index has been produced and published since the 1st quarter of 2003. Table 8 presents index values from the 1st quarter of 2005 to 1st quarter of 2008.

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Table 8. Turnover index for telecommunication industry (NACE 64.2)

Quarter	Turnover index (2005=100)
Q12005	95.0
Q22005	98.1
Q32005	99.6
Q42005	107.2
Q12006	109.5
Q22006	105.5
Q32006	109.3
Q42006	116.5
Q12007	113.2
Q22007	114.0
Q32007	117.0
Q42007	126.2
Q12008	120.7

There are uncertainties in the data. VAT-units report their turnover to the VAT Register using a VAT-number. Several enterprises are registered under the same VAT-number in the VAT register. (VAT-units report for multiple enterprises). This is a potential problem especially when the enterprises are registered in more than one NACE groups or when they have multiple locations in different geographical areas. Another possible source of error is that the key for breakdown of turnover from VAT-unit to establishments is based on two-year-old information.

The Central Register of Establishments and Enterprises defines the population and provides information about the units. Errors in this administrative register like time gaps in registration, incorrectly identified unit characteristics etc. may therefore be a potential source adding to the uncertainty in the index.

In addition, total turnover reported by the VAT-units might include revenue from transactions excluded from the definition of turnover from SBS e.g. sales of fixed assets.

Table 9 compares the growth rates of annual turnover derived from the structural business statistics to those collected from the short-term statistics in the period from 2004 to 2006. There are evident differences between the two statistics, and the SBS data fluctuate less than the STS data.

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Table 9. Telecommunication. Comparison of turnover SBS and STS. Annual growth rates. 2004-2006

	SBS	STS
2004	4.6 %	6.7 %
2005	-2.5 %	-4.2 %
2006	6.5 %	10.2 %

There are several causes for differences between the SBS and the STS. The most important one seems to be the different treatment of changes in the business population. We believe that SBS data are the more reliable being subject to more detailed editing and processing. In addition the SBS sources of turnover data are considered to be more reliable than VAT-reported turnover.

Despite of the differences between the two statistics they both serve a purpose:

- SBS gives a measure of the level of economic activity in the industry.

- STS measures short-term economic developments. The focus is on the changes from a short period of time to the next.

Generally there are more resources allocated to the production of the structural business statistics. This is due to the fact that the SBS is partly a sample survey, but also because the SBS includes considerably more variables than the STS. Prior to 2002, the STS was a sample survey. It was decided however, to make use of the VAT-register because it was less resource demanding. Considerable manpower is needed in order to manage the vast SBS sample. This includes people from several departments within the organization. The method of receiving electronic data files on tax-data declarations is more effective in that respect. In the SBS, a team of three people is responsible for the telecommunication industry. Two of them are mainly involved in the editing process. They have no higher education background. The third person is responsible for analysing and disseminating the final figures and usually has some sort of higher education. In the STS there is a similar division of labour, but there is usually just one person involved in the editing process.

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8. Comparability of turnover/output data with price index practices

The service producer price index (SPPI) for telecommunications was published for the first time in June 2008. The index consists of services offered to private households (B2C) and to the business market (B2B). The index for private households is converted from the monthly consumer price index (CPI). The SPPI index does not publish product level details below the industry aggregate level.

In lack of a producer price index for the whole market the national accounts use CPI as an indicator when estimating volume (constant price) figures for the telecommunication industry. The national accounts will start using the SPPI price index for telecommunications next year.

Sample survey

While turnover/output data are collected from administrative registers, the SPPI for telecommunications is a sample survey. The price index only includes 7 large enterprises, which means that about 690 enterprises are left out (see Table 3). The sample enterprises are picked out based on their share of total industry turnover, and they cover about 90 per cent of the market. Technically the smallest sampled enterprises in the survey are assumed to represent the large number of small actors. Some adjustments in weighting shares are introduced to handle this.

Product level

The SPPI for the telecommunication industry collects prices from several price components in fixed telephone services, mobile telephone services and internet services. The price components are chosen based on information from the enterprises in the sample. According to the national classification SN2002 this covers 64.21 *Fixed telecommunication carriers*, 64.22 *Mobile telecommunication carriers*, 64.23 *Internet service providers*. 64.24 *Other telecommunication activities* is left out of the SPPI because it is hard to identify homogeneous services from this category that are suitable for price measurements.

The SPPI for telecommunication covers activities at a less detailed level than in the CPA 2002. Table 10 gives an overview of activities included in the SPPI compared to the CPA.

Table 10. Product activities covered by the SPPI.

CPA 2002	Activities	SN2002
64.20.11	Public local telephone services	64.21
64.20.12	Public long distance telephone services	64.21
64.20.13	Mobile telephone services	64.22
64.20.18	Internet access provision services	64.23

As the turnover/output surveys, the SPPI survey will be affected by the transition to the new standard classifications, SN2007 (NACE rev. 2) and CPA 2008. The SPPI's coverage will include 61.1 *Wired telecommunication activities* and 61.2 *Wireless telecommunication*

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activities. 61.3 *Satellite telecommunications activities* will be considered included in the index. That depends on the activities' market shares in the industry. The changes in the product allocation in the industry might make it easier to find homogenous products to measure the price movements in 61.9 *Other telecommunication activities*. If so, these activities will be considered in the index as well.

The pricing methods and collection of prices and weighting data

The SPPI use component pricing and the respondents are asked for detailed price information on the different services. Electronic questionnaires are used every quarter to collect data on fixed telephone and mobile telephone services offered to the business market, and they report contract prices. There are few or no discounts on Internet services offered to businesses and on the services offered to private households, and list prices are collected from the enterprises' websites every month.

Turnover data from the Norwegian Post and Telecommunications Authority (NPT) is used as weighting data in preference to data from the structural business statistics (SBS). This is mainly due to a timing aspect where updated data from NPT is available much earlier than is the case for SBS data. Rapid changes in the telecommunication industry require frequent updates (once a year) in the weighting data. Use of turnover data from the short-term statistics (STS) is not an alternative since these data are not sufficiently detailed

Annual questionnaires are sent to the respondents in the B2B sample. The respondents provide detailed information on turnover shares on the price components that are used as weighting data. This is a bit of a time burden for the respondents and for the staff who calculate the weights.

Because of the small sample there is only one economist who does all the work from the collection of data to the publishing of the indices.

Turnover vs. price movements

Table 11 shows greater movements in turnover than in prices in the telecommunication industry from the last quarter of 2005 to the same quarter in 2007. In the second half of 2007 actors in the industry experienced a strong growth in turnover while prices remained relatively stable. This indicates that the growth in turnover first of all was caused by higher traffic in the services.

Table 11. Movements in turnover and prices in the telecommunication industry. Per cent. 4th qr. 2005-4th qr. 2007.

	Quarterly percentage movements	
	Turnover*	Prices
1st qr. 2006	2.1	-1.8
2nd qr. 2006	-3.7	0.1
3rd qr. 2006	3.6	-3.6
4th qr. 2006	6.6	-1.7
1st qr. 2007	-2.8	-0.1
2nd qr. 2007	0.7	-0.1
3rd qr. 2007	2.6	-0.3
4th qr. 2007	7.9	-0.6

*Turnover index

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9. Summary

With the new standard classifications (SN2007 and CPA 2008) Statistics Norway expects to have an allocation of activities within industries that is more up to date. This might give more accurate measures of the economy, especially in telecommunication where the changes have been substantial during the last decade.

Fast-paced technological progress makes detailed measurements on turnover/output and prices a challenging task. The activities tend to converge within the industry and in the whole ICT-sector.

There seems to be some differences in the methods and concepts between the structural business statistics and the turnover index. We believe that the SBS is the most reliable source, but although the turnover index has its challenges, it is useful as an output measure in the national accounts. Together with the price index it is possible to estimate the development in volume for the industry. There are few short-term statistics on services in Norway, and the turnover index is also a valuable indicator for Norway's central bank.

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Appendix: Product detail level

CPA 2002

64.20.11	Public local telephone services
64.20.12	Public long distance telephone services
64.20.13	Mobile telephone services
64.20.14	Shared business network services
64.20.15	Dedicated business network services
64.20.16	Data network services
64.20.18	Internet access provision services
64.20.21	Television transmission services
64.20.22	Radio transmission services
64.20.23	Interconnection services
64.20.28	Other telecommunications services
64.20.30	Radio and television cable services

CPA 2008

61.10.11	Fixed telephony services - access and use
61.10.12	Fixed telephony services - calling features
61.10.13	Private network services for wired telecommunication services
61.10.20	Carrier services for wired telecommunications
61.10.30	Data transmission services over wired telecommunication networks
61.10.41	Internet backbone services
61.10.42	Narrow-band internet access services over wired networks
61.10.43	Broad-band internet access services over wired networks
61.10.49	Other wired telecommunications services
61.10.51	Home programme distribution services over wired infrastructure, basic programming package
61.10.52	Home programme distribution services over wired infrastructure, discretionary programming package
61.10.53	Home programme distribution services over wired infrastructure, pay-per-view
61.20.11	Mobile telecommunications services - access and use
61.20.12	Mobile telecommunications services - calling features
61.20.13	Private network services for wireless telecommunications systems
61.20.20	Carrier services for wireless telecommunications
61.20.30	Data transmission services over wireless telecommunications networks
61.20.41	Narrow-band internet access services over wireless networks
61.20.42	Broad-band internet access services over wireless networks
61.20.49	Other wireless internet telecommunications services
61.30.11	Home programme distribution services via satellite, basic programming package
61.30.12	Home programme distribution services via satellite, discretionary programming package
61.30.13	Home programme distribution services via satellite, pay-per-view
61.90.10	Other telecommunications services

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Statistics Norway:
www.ssb.no

Statistics Norway, *Statistical Analyses - 2.3 Lønn for heltidsansatte*, 2006 (SA 80)

Statistics Norway, *Statistical Analyses – Telekommunikasjon, ei næring i sterk vekst* (Trygve Osvoll), 2008 (SA 98)

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