



# **Monitoring the Digital Economy and Electronic Communications Services in the Western Balkans and Turkey**

## **Market Report**

### **2019 Follow-up Study Report**

SMART 2016/0024

#### **FINAL REPORT**

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## Economies examined in the study

AL	Albania
BA	Bosnia and Herzegovina
ME	Montenegro
MK	North Macedonia
RS	Serbia
TR	Turkey
XK	Kosovo*

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\* This designation is without prejudice to positions on status, and is in line with UNSCR 1244(1999) and the ICJ Opinion on the Kosovo declaration of independence.



## ***Abstract***

The study developed six thematic dimensions, comprised of 40 indicators, to monitor market development for electronic communications and digital services in the Western Balkans economies and Turkey in relation to the requirements of the European Union.

Many of the electronic commerce dimension indicators are closely aligned with Digital Economy and Society Index (DESI) information that had not previously been collected. Consequently, there was limited information available for some indicators.

The project, in the second year of a three-year study, now enables comparison with a similar survey last year (2018) in the Western Balkans economies and Turkey. They have provided the same proportion of the data required by the study – 60 per cent.

There has been a 7 per cent increase, to 29 per cent, in the number of indicators where performance by a Western Balkans economy is above the EU average level. In a similar positive manner the number of indicators where performance is 20 per cent or more below the EU28 average has decreased – from 60 per cent in the 2018 study to 43 per cent in this study.

## Executive Summary

On 6 February 2018, the Commission presented the Western Balkans Strategy in the Communication *"A credible enlargement perspective for and enhanced EU engagement with the Western Balkans"*.

The Communication of 6 February 2018<sup>2</sup>, announced that, *"together with the partners in the Western Balkans, the Commission will launch a Digital Agenda for the Western Balkans, including a roadmap to facilitate lowering the cost of roaming"*. The Digital Agenda for the Western Balkans is one of the six flagship initiatives of the Western Balkans Strategy.

The aim of this three-year research study is to monitor progress made by the Western Balkans economies and Turkey towards compliance with the European Union (EU) rules for electronic communications and information society services, and convergence with the internal market.

To measure progress in the digitalisation of economy and society within the EU, the Commission has established the Digital Economy and Society Index<sup>3</sup> (DESI), summarising indicators on digital performance and digital competitiveness.

This report presents results from the second year of a three-year research contract. The objective, of the first year of the study, was to develop the collection of the Digital Economy and Society Index (DESI) and associated indicators to monitor regulations and policies in the Western Balkans and Turkey. To support the collection of this data the European Commission provided a workshop for regulators, government officials and representatives from Statistical Agencies in March 2019. The one-day workshop highlighted that it usually takes about two years to pilot, collect, validate and analyse new statistics. It is therefore expected that data provision will improve in future years.

The study has once again adopted the six DESI thematic dimensions, and selected 40 of the indicators<sup>4</sup>, to monitor market development for electronic communications and digital services. The first five dimensions mirror the indicators that comprise DESI. The sixth dimension of this study focuses on telephony and market revenues. These indicators have been collected in previous studies and they provide valuable market insights to service coverage, uptake, financial health and infrastructure growth and investment in the Western Balkans economies and Turkey.

To provide a performance overview of the indicators for Western Balkans economies and Turkey a traffic light style categorisation has been adopted. Green cells in tables and graphics indicate performance at or above the average performance of EU28 Member States. Red cells indicate considerable room for improvement (generally indicating performance at 20 per cent or more below the EU average).

1. **Connectivity dimension:** This dimension had nine indicators (thus creating 63 cells across the Western Balkans economies and Turkey). Data provision for this dimension was second highest amongst the six dimensions – 73 per cent of indicator information was received<sup>5</sup>. 30 per cent of cells (where data was provided) meet or exceed EU28 average performance levels. 43 per cent of cells were red (indicating the lowest level of performance).

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<sup>2</sup> COM (2018) 65\_final, section 5

<sup>3</sup> <https://ec.europa.eu/digital-single-market/en/desi>

<sup>4</sup> The 2018 study utilised 37 indicators. The additional indicators in this study include - 1D.1 Ultrafast broadband coverage, 1D.2 Ultrafast broadband take-up and 5B.1 eHealth.

<sup>5</sup> This dimension is aligned with International Telecommunication Union (ITU) indicators which many countries around the world have been collecting for many years.

2. **Digital skills dimension:** Just over half the data (57 per cent) was received for this direction. 25 per cent of cells (where data was provided) met or exceeded EU28 average performance levels. 40 per cent of cells were red (indicating performance at least 20 per cent below the EU28 average).
3. **Citizen Internet use dimension:** This is one of the dimensions where there is room for improvement. 50 per cent of cells were red (indicating performance at least 20 per cent below the EU28 average). All economies providing data were more than 20 per cent (red) below the EU28 average for online banking and shopping. 32 per cent of cells (where data was provided) met or exceeded the EU28 average.
4. **Business technology integration dimension:** Data provision for this dimension was relatively low (48 per cent; 27 of 56 cells). But performance was the highest of all dimensions. 52 per cent of cells met or exceeded the EU28 average. Only 7 per cent were red - 20 per cent or more below the EU28 average.
5. **Digital public services dimension:** Data provision was the lowest for this dimension (38 per cent; 16 of 42 cells). This is also the dimension where there is greatest room for improvement. 75 per cent of cells were red (indicating performance at least 20 per cent below the EU28 average). 6 per cent of cells (where data was provided) met or exceeded the EU28 average.
6. **Telephony and market revenue dimension:** This dimension obtains information from regulators and mobile operators and is thus easier to obtain<sup>6</sup>. As result, data provision is the highest of all dimensions - 89 per cent. This dimension also has room for improvement. 52 per cent of cells were red (indicating low performance). Only 19 per cent of cells met or exceeded the EU28 average.

A comparative overview of the performance of the six Western Balkans economies and Turkey in the previous study (2018) and this study (2019) in providing data and meeting EU28 average performance levels is provided in the table below.

	2018 indicators provided	2019 indicators provided	2018 Cells above EU average	2019 Cells above EU average	2018 Cells 20 per cent or more below EU avg.	2019 Cells 20 per cent or more below EU avg.
AL	14%	48%	20%	21%	60%	58%
BA	24%	18%	22%	14%	78%	71%
ME	70%	83%	38%	36%	46%	30%
MK	81%	58%	10%	26%	70%	48%
RS	89%	100%	33%	38%	48%	28%
TR	78%	55%	7%	9%	71%	64%
XK	62%	60%	22%	38%	57%	42%
Average	60%	60%	22%	29%	60%	43%

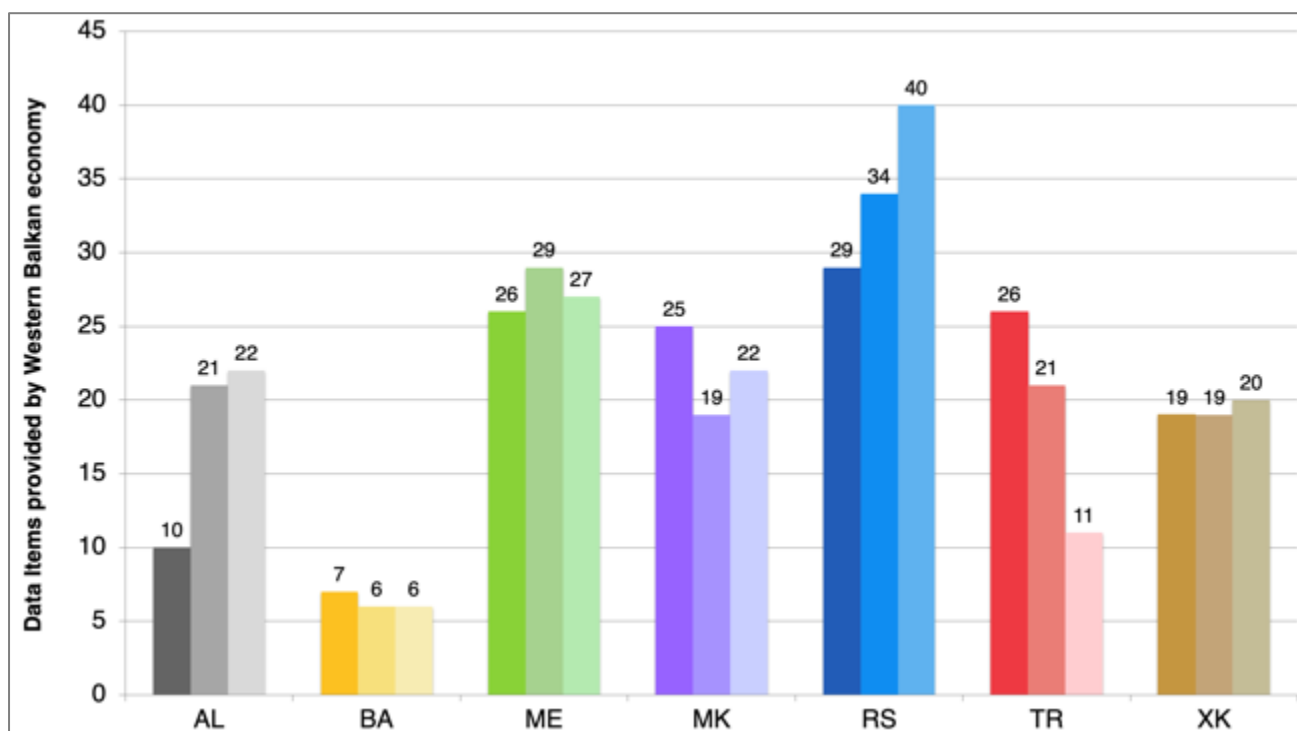
Overall, there has been improved performance between last year's study and this one, by five economies, which have increased the percentage of indicators meeting or exceeding the EU28 average (green cells). In addition, all economies have decreased the number of indicators over 20 per cent below the EU28 average level (red cells).

Tables in chapter 2 use the latest available data (usually for 2018) to provide a comparative overview relative to EU requirements for each dimension. These tables reveal that 60 per

<sup>6</sup> Data from the other dimensions is primarily obtained from household and business surveys with relatively large sample sizes.

cent of data requested has been provided by relevant organisations in Western Balkans economies and Turkey.

Annex 2 enables readers to take a closer look at the performance of each of the Western Balkans economies and Turkey. These economy overviews, which use the latest data (generally for 2018), reveal the amount of information provided by each economy, see the figure below.



# 1. Introduction

On the 6<sup>th</sup> February 2018, the European Commission published their report - *A credible enlargement perspective for and enhanced EU engagement with the Western Balkans*.<sup>7</sup> The Enlargement Report highlighted that the region has come a long way since the end of the 1990s. However, it noted that none of the Western Balkans economies<sup>8</sup> has yet met the criteria of Article 49 of the Treaty on European Union, including the Copenhagen criteria, required to join the European Union.

Criteria for Article 49 concern the rule of law, fundamental rights and good governance. In the context of this study, which examines electronic communications and digital services, it is notable that European Commission enlargement criteria include digital infrastructure, digital policies, the digital economy and digital society<sup>9</sup>. Indeed, section five of the Enlargement Report focuses on the development of infrastructure and skills, the digitalisation of industry and the digital society. These initiatives are combined together and underpinned the launch of a Digital Agenda for the Western Balkans that aims to support the transition of the region towards a digital economy and bring the benefits of the digital transformation, such as faster economic growth, more jobs, and better services.<sup>10</sup>

This study provides an overview of the position of the Western Balkans economies and Turkey in 2019 and provides a benchmark against which to gauge improvements from the previous study in 2018.

Evaluation and monitoring play an important part in benchmarking performance and monitoring progress towards policy goals. Results from monitoring provide a mirror that can be held up to the economies studied so that Western Balkans economies can clearly see themselves and other countries (within the EU28) in the same perspective.

Benchmarking usually concentrates on figures and avoids comments. This benchmarking study, like many others, contains a lot of detail and data can be analysed in many ways to reveal and examine underlying differences. Many economies and nations might have economic and cultural reasons for high or low scores in individual indicators.

## 1.1. Study objectives

The objective of the study is to assist the European Commission - and ultimately the concerned national authorities - in monitoring key digital developments in seven economies, which are at various stages of the accession process: Albania (AL), Bosnia and Herzegovina (BA), Montenegro (ME), North Macedonia (MK), Serbia (RS), Turkey (TR) and Kosovo (XK).

An additional objective is to keep track of the progress made in digitalisation in the region using the Digital Economy and Society Index (DESI) and associated indicators to monitor market developments for electronic communications and digital services in the Western Balkans economies and Turkey. The project, in the second year of a three-year study, aims to create a cohesive methodology, based on DESI indicators and principles, to collect and present relevant digital indicators on an annual basis in 2019 and 2020. Results from the

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<sup>7</sup> European Commission. 2018. A credible enlargement perspective for and enhanced EU engagement with the Western Balkans COM (2018) 65 final.

<sup>8</sup> This study examined Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia and Turkey. For ease of presentation these seven are referred to as the 'Western Balkans economies' throughout this report.

<sup>9</sup> Ibid. European Commission. 2018. On pages 9, 13, 14 and

<sup>10</sup> European Commission. 2018. Measures in support of a Digital Agenda for the Western Balkans. COM (2018) 360 final.

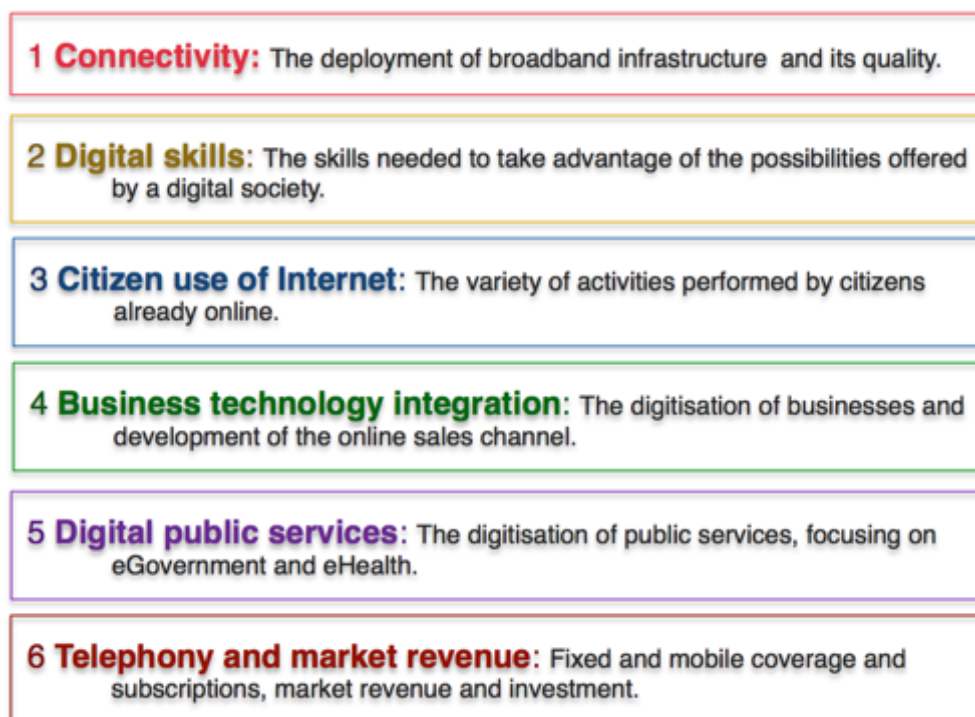


2018 study can be seen in a separate report<sup>11</sup> and previous performance for all indicators is provided in annex 3.

This report provides a further step towards providing comprehensive access to DESI compatible indicators, alongside other relevant measures. Progress will be required in future years to address gaps in data provision. Complete datasets from the region for all DESI dimensions are currently missing, and therefore integration with the EU DESI can only take place progressively as the relevant Western Balkans authorities are able to provide the full sets of data, in accordance with the EU acquis on statistics where applicable.

## 1.2. Study dimensions and indicators

DESI methods and indicators underpin the study. The study has developed six dimensions to monitor market development for electronic communications and digital services in the Western Balkans and Turkey. The dimensions can be seen in **Error! Reference source not found.**<sup>12</sup>.



**Figure 1 The six dimensions utilised in the study**

The first five dimensions, consisting of 35 indicators, mirror the Digital Economy and Society Index. One of the benefits of replicating DESI indicators is that five years of data for EU28

<sup>11</sup> <https://publications.europa.eu/en/publication-detail/-/publication/2e0e1320-5118-11e9-a8ed-01aa75ed71a1/language-en/format-PDF/source-92671971>

<sup>12</sup> This study adheres to DESI indicator codes where possible. On occasions due to the collection of additional information indicator codes in this document do not precisely align with DESI indicator codes. The first two years of this study have provided a transition from a larger group of indicators (used in previous studies) to a smaller set of indicators more closely aligned with DESI. Usually definitions in previous studies align precisely with DESI definitions. On some occasions in this transition year they did not. In future years DESI definitions will be used for relevant indicators.

Member States, since 2014, is available. It is therefore possible to compare the performance of Western Balkans economies and Turkey with EU28 Member State average performance.

Analysis of the five DESI compatible dimensions facilitates comparative analysis to examine gaps in data provision and performance within the Western Balkans economies and Turkey; also between Western Balkans economies, Turkey and EU28 Member States. This comparative analysis emphasises where performance needs to improve and highlights areas where best practices might be identified and shared.

Dimension six, comprised of five indicators, focuses on the telephony market and competition. These aspects are not included by DESI, which mainly focuses on digital matters. However, examination of fixed and mobile telephony subscriptions and operator market shares has been collected in previous studies and these indicators provide valuable market insights. This dimension also examines investment by operators. These indicators provide insights to financial health, infrastructure development and investment.

At this point it is appropriate to describe the structure of this report. Chapter 2 provides a short overview of the performance of Western Balkans economies and Turkey for each of the six dimensions. If readers are interested in focusing on individual economies they should consult Annex 2 where an overview for each economy is provided of performance for all 40 indicators. If further details are required about any of the indicators that comprise the six dimensions they can be found in Annex 3.

A complete list of the indicators that comprise the 6 dimensions can be found in Annex 1.

Annex 2 provides a one-page overview for each Western Balkans economy and Turkey for the six dimensions comprised of 40 indicators (where information is available). This enables readers to see on a single page how much information has been provided and how each economy is performing for each indicator in 2018.

Annex 3 focuses on each of the indicators. A one-page overview is provided for each indicator. For the electronic communications dimensions each page usually consists of a graph plotting the performance of each Western Balkans economy, Turkey and the EU28 average between 2013 and 2018 (where information is available). A short descriptive commentary is also provided.

### **1.3. The performance appraisal methodology**

To provide an overview of performance for all indicators for Western Balkans economies and Turkey a traffic light style methodology is used, see **Error! Reference source not found.**

Comparison is made with the EU28 Member State average performance. By definition this might be regarded as an onerous benchmark for comparison, since to achieve the average level of EU28 performance the Western Balkans economy being examined would have to be performing at a level higher than 14 EU Member States<sup>13</sup>.

For the indicators in the six dimensions colour coding of results is undertaken in relation to how closely a Western Balkans economy or Turkey is to the EU average, four ordinal categories have been defined.

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<sup>13</sup> In general the EU28 average performance for an indicator will be the rough equivalent of 14<sup>th</sup> out of 28 EU Member States. It is acknowledged that there will be some mathematical oddities with outliers where the EU28 average is not equivalent to the 14<sup>th</sup> ranked EU Member State.

**Table 1 Traffic lights categorisation for quantitative indicators and qualitative sub-dimensions**

Performing above the average of EU28 Member States.	
Performing within 10 per cent of the EU28 Member States average.	
Performing between 20 and 10 per cent of the EU28 Member States average.	
Not performing within 20 per cent of the EU28 Member States average.	

Throughout the next chapter, which provides an overview of the six dimensions, performance data is provided for each indicator and relevant cells are shaded (green through to red) according to the performance appraisal methodology presented above. Green indicates performance at EU28 Member State standards. Red indicates considerable room for improvement. The tables produced for each dimension provide readers with an immediate insight to how economies are performing relative to EU requirements for each indicator.

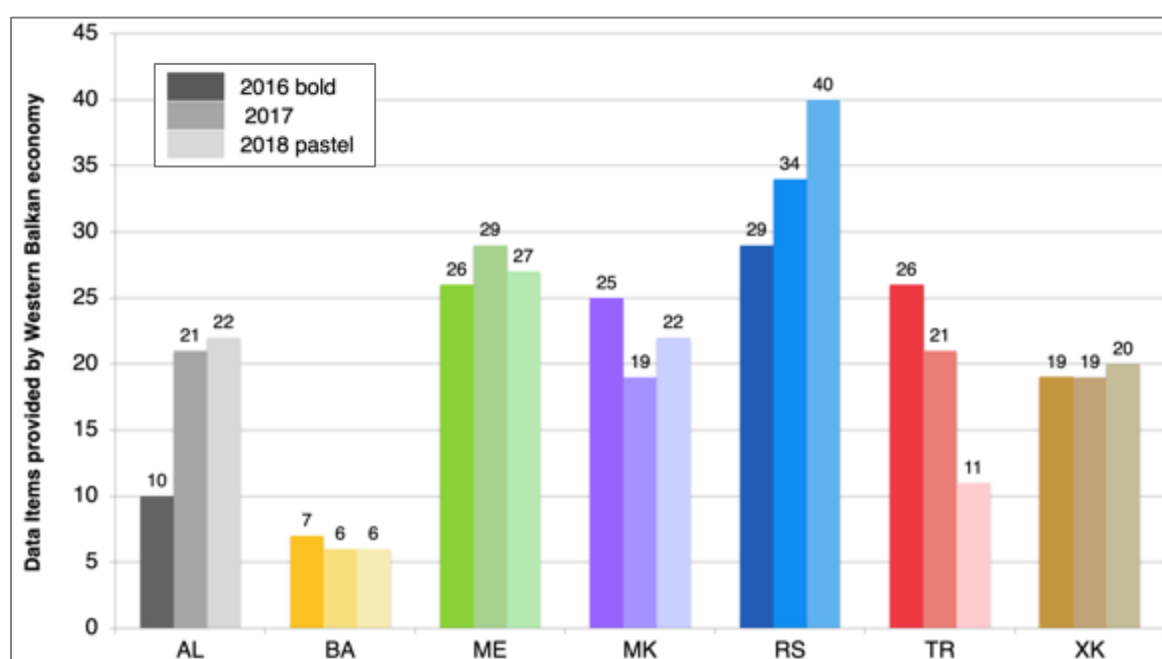
## 2. Performance overview

### 2.1. Introduction

This chapter provides an overview of the performance of Western Balkans economies and Turkey. The format for presenting information is consistent across all dimensions. A graphic at the start of each dimension provides a colour-coded guide to the theme for the dimension<sup>14</sup>, relevant sub-dimensions and all indicators that comprise the sub-dimensions<sup>15</sup>.

After introducing the key sub-dimensions and indicators a table provides an overview of performance. The first row of the table for each dimension records the number of indicators for which information is available in 2018. In some instances data for 2018 has not been provided, if data from 2017 (16 occurrences) or 2016 (one occurrence) is available this has been provided<sup>16</sup>. These occurrences are clearly described.

Data provision by Western Balkans economies offers a useful insight to information collection capabilities and where more effort is required to collect data in the future. Figure 2 provides an overview of the number of indicators provided for each year between 2016 to 2018.



**Figure 2 The number of data indicators provided by Western Balkans economies 2016 to 2018**

The first column in each table provides data, where available, about the average performance of EU28 Member States. The remaining seven columns provide performance scores for the economies examined in this study – Albania, Bosnia and Herzegovina,

<sup>14</sup> For example digital skills indicators are all shaded brown and citizens use indicators are blue. The colour coding system follows the rubric utilised in the 2018 I-DESI study.

<sup>15</sup> Indicators marked with an asterisk are not presented in performance tables. This is generally because comparative information is not available for EU28 Member States or insufficient information is available about Western Balkans economies and Turkey.

<sup>16</sup> Figure 2 and Annex 2 only record data provided each year for 2016, 2017 and 2018. Tables in this section also include statistics from previous years where there are gaps in provision. For this reason the count of indicators available may reveal some differences with totals provided in Figure 2 and Annex 2.

Kosovo, North Macedonia, Montenegro, Serbia and Turkey<sup>17</sup>. The ‘traffic lights’ colour coding system, described in section **Error! Reference source not found.**, is used in the performance tables to indicate performance in relation to the EU28 average performance.

Most performance issues are immediately visible to readers and the ‘traffic lights’ categorisation provides an immediate insight to relative performance. Our commentary throughout this report is therefore kept to a minimum. We restrict our observations to highlighting more subtle elements in tables and in providing insights to the information, how it was obtained or why gaps arise.

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<sup>17</sup> Where figures are available. Where information is not available cells are shaded grey.

## 2.2. The connectivity dimension

The connectivity dimension is comprised of eleven indicators that examine the deployment of broadband infrastructure, broadband uptake and the speed of connections, see **Error! Reference source not found.**<sup>18</sup>.

1 Connectivity	Fixed broadband (1A)	Fixed broadband coverage (1A.1)
		Fixed broadband subscriptions (1A.2)
	Mobile broadband (1B)	4G coverage (1B.1)
		Mobile broadband subscriptions (1B.2)
	Speed (1C)	Coverage of high-speed networks (>30 Mbps) (1C.1)
		Subscriptions to fixed high speed broadband (>30 Mbps) (1C.2)
		Ultrafast coverage (1D.1)
	Affordability (1E)	100Mbps take-up (1D.2)
		Fixed broadband price (1E.1)

**Figure 3 Connectivity dimension indicators**

A number of key terms are used describe the use of broadband. It is appropriate to establish these here.

**Broadband** – Broadband is the term applied to high speed telecommunications systems, i.e. those capable of simultaneously supporting multiple information formats such as voice, high-speed data services and video services on demand<sup>19</sup>. Broadband is comprised of both the connection to a network capable of supporting suitable bandwidth and the Internet access service delivered over that connection. The European Commission regarded 144 Kbps as the minimum level to define broadband. The Digital Agenda broadband access targets for European households define three levels of broadband speeds to be measured: 2, 30 and 100 Megabits per second<sup>20</sup>.

**Connectivity** – A broadband connection can be provided by fixed or wireless/mobile technologies. This report uses the term 'connectivity' to describe a household or location where a broadband network is available and there is the capability to connect to that broadband network. The terms 'coverage' and 'availability' refer to households or locations with broadband connectivity.

**Subscription** – If a user has a connection available, they can choose (or not) to subscribe and use a broadband network. This report uses the terms 'penetration' or 'take-up' to refer to percentage of households or locations that have subscribed to and use broadband relative to the total number of households.

<sup>18</sup> DESI has two speed sub-dimensions – Fast broadband (sub-dimension C) and ultrafast broadband (sub-dimension D). These two sub-dimensions have been combined into a single 'speed' category in this study, but the indicator codes still adhere to the DESI coding system (e.g. 1C.1 and 1D.1). As a result of this amendment the fourth sub-dimension in **Error! Reference source not found.** is coded as 1E.1.

<sup>19</sup> EC. 2015. Broadband glossary. <https://ec.europa.eu/digital-agenda/en/broadband-glossary>

<sup>20</sup> The European Commission's Digital Agenda broadband access targets for European households requires EU28 Member States to be covered by broadband speeds above 30 Mbps by 2020, while 50 per cent or more of EU households should subscribe to broadband speeds above 100Mbps. The Common EU Broadband targets for 2025 propose that all European households, rural or urban, should have access to networks offering a download speed of at least 100 Mbps, which can be upgraded to 1 Gigabit. <https://ec.europa.eu/digital-single-market/en/broadband-strategy-policy>

**Error! Reference source not found.** provides an overview of the performance in 2018 of Western Balkans economies and Turkey for the indicators that comprise the connectivity dimension. Information for 73 per cent of the cells in **Error! Reference source not found.** was received. This is a ten per cent improvement from the 2018 study.

**Table 2 Connectivity dimension performance**

Indicator	EU Avg	AL	BA	ME	MK	RS	TR	XK
Indicators for which data available		8	1	8	7	9	5	8
1A.1 Fixed BB Coverage %	97%	13%		90%	98%	72%		100%
1A.2 Fixed BB Take-up %	76%	12%	18%	81%	66%	62%	56%	18%
1B.1 4G Coverage % <sup>TK</sup>	91%	87%		97%	100%	96%	87%	89%
1B.2 Mobile BB Take-up (per 100 pop)	90	65		75	69	83	75	92
1C.1 NGA Coverage %	80%	14%		71%	50%	68%		97%
1C.2 Fast BB Take-up	34%	4%		52%	21%	44%	9%	33%
1D.1 Ultrafast BB Coverage	57%	0%		61%		67%		9%
1D.2 Ultrafast BB Take-up %	15%	1%		5%	1%	2%	0%	
1E.1 Broadband Price Index	87					57		5

<sup>TK</sup> 2017

Performance data for the first sub-dimension - Fixed Broadband (indicators 1A.1 to 1A.2) – shows that in comparison with EU28 averages fixed broadband performance is generally below levels achieved by EU Member States.

A similar picture of performance below EU28 averages is also evident for the mobile broadband sub-dimension (indicators 1B.1 and 1B.2). 4G coverage has grown considerably in the last four years. Half of the Balkans economies are above the EU28 average of 91 per cent.

The third sub-dimension examines broadband connection speeds (indicators 1C.1 and 1C.2<sup>21</sup>). In all but one economy (Kosovo) NGA broadband coverage is lagging behind the EU28 average level of 80 per cent. But where significant deployment has been achieved (Montenegro, Serbia and Kosovo) fast (NGA) broadband subscriptions are near of above the EU average.

The final sub-dimension examines the price for fixed broadband access using a 0 to 100 scale. Some economies were able to provide average price data but not indexed data. A method to better enable comparison will be adopted in the next study<sup>22</sup>.

<sup>21</sup> Two speed sub-dimension indicators are omitted from **Error! Reference source not found.**. Data for subscriptions to connections over 100 Mbps 1D.2 is available, though generally this records less than one per cent ultrafast take-up. However, comparable data for EU28 Member States is not available. None of the Western Balkans economies and Turkey were able to provide data about ultrafast coverage (indicator 1D.1).

<sup>22</sup> This could be broadband prices for a stipulated download speed as a percentage of disposable income. But EU28 average data (1.27 per cent) is only available up to 2015. [https://digital-agenda-data.eu/datasets/digital\\_agenda\\_scoreboard\\_key\\_indicators/visualizations](https://digital-agenda-data.eu/datasets/digital_agenda_scoreboard_key_indicators/visualizations)



## 2.3. The digital skills dimension

The digital skills dimension is comprised of five indicators that examine the skills needed to take advantage of the possibilities offered by a digital society, see **Error! Reference source not found.**

2 Digital skills	Basic skills and usage (2A)	Internet users (2A.1)
		Individuals never having used the internet (2A.1B)
		Individuals with at least basic skills (2A.2)
	Advanced skills and development (2B)	Share of ICT specialists in the workforce (2B.1)
		Graduates in STEM (2B.2)

**Figure 4 Digital skills dimension indicators**

**Error! Reference source not found.** provides an overview of the performance in 2018 of Western Balkans economies. Only North Macedonia and Serbia provided data for all the indicators. Information for 57 per cent of the cells in **Error! Reference source not found.** was received, this was the same as for the 2018 study. Only two economies were able to provide all the required information.

**Table 3 Digital skills dimension performance**

Indicator	EU Avg	AL	BA	ME	MK	RS	TR	XK
Indicators for which data available		1	1	3	3	5	4	3
2A.1 Internet Users % <sup>AL</sup>	81%	72%	90%	71%	78%	73%	73%	87%
2A.1B Individuals Not Using the Internet % <sup>TK</sup>	13%			23%	18%	24%	33%	7%
2A.2 At least Basic Digital Skills % <sup>ME TK</sup>	57%			50%		66%	33%	
2B.1 ICT Specialists %	4%				12%	2%		1%
2B.2 STEM Graduates <sup>TK</sup>	19%					18%	12%	

AL ME TK 2017

The level of internet use in all economies (and EU28 Member States) has increased every year since 2013. Most Western Balkans economies are still behind the internet usage level of EU28 Member States. As might be expected, conversely, the proportion of individuals not using the internet is significantly greater than for EU Member States in all economies except Kosovo.

There is a lack of advanced skills data (relating to sub-dimension 2B), in comparison with basic skills statistics<sup>23</sup>. Western Balkans economies and Turkey are generally well behind EU28 Member States in advanced digital skills – Serbia is closest to the EU averages.

<sup>23</sup> Data provided by North Macedonia suggests it is an exception to this general assertion.



## 2.4. Citizen use of the internet dimension

The citizen use of the internet dimension is comprised of seven indicators that examine a variety of activities performed by citizens already online, see **Error! Reference source not found..**

3 Citizen use of Internet	Content (3A)	News (3A.1)
		Music, video and games (3A.2)
		Video on-demand (3A.3)
	Communications (3B)	Video calls (3B.1)
		Social networks (3B.2)
	Transactions (3C)	Banking (3C.1)
		Shopping (3C.2)

**Figure 5 Citizen use of the internet dimension indicators**

**Error! Reference source not found.** provides an overview of the performance in 2018 of Western Balkans economies and Turkey for the indicators that comprise the citizen use of the Internet dimension. Only three of the economies were able to provide data for five or more of the seven indicators in **Error! Reference source not found..** Information for 57 per cent of the cells in **Error! Reference source not found.** was received, this was the same as for the 2018 study.

**Table 4 Citizen use of the internet dimension performance**

Indicator	EU Avg	AL	BA	ME	MK	RS	TR	XK
Indicators for which data available		0	0	7	6	7	4	4
3A.1 News % <sup>ME MK TK</sup>	73%			72%	65%	78%	44%	
3A.2 Music, Videos and Games %	78%			21%		73%		
3A.3 Videos on Demand %	21%			10%	12%	23%		
3B.1 Video Calls % <sup>TK</sup>	46%			83%	76%	67%	40%	85%
3B.2 Social Networks %	65%			84%	82%	70%		64%
3C.1 Banking % <sup>TK</sup>	61%			3%	12%	20%	23%	1%
3C.2 Shopping % <sup>TK</sup>	68%			16%	32%	16%	25%	3%

ME MK TK 2017

Performance in the content sub-dimension for most economies providing information was mixed, Serbia shows the highest levels of use in two areas above the EU28 average.

Performance related to the communications dimension is very good, with all economies at levels above or very close to the EU average. Western Balkan economies and Turkey score on average higher than the EU28 average for the use of internet for video calls and social networks.

Utilisation of transaction services (sub-dimension 3C) for banking and shopping has risen modestly in Western Balkans economies and Turkey over the past four years, but they still remain far behind the EU28 average.

## 2.5. Business technology integration dimension

The business technology integration dimension is comprised of eight indicators that examine the digitisation of businesses and development of the online sales channel, see **Error! Reference source not found.**

4 Business technology integration	Business digitisation (4A)	Enterprises sharing internal information electronically (4A.1)
		Business connectivity (4A.1B)
		Enterprises using social media (4A.3)
		Enterprises sending and/or receiving invoices (4A.4)
		Enterprises using Cloud (4A.5)
	eCommerce (4B)	SMEs selling online (4B.1)
		Turnover from eCommerce (4B.2)
		SMEs selling online cross-border (4B.3)

**Figure 6 Business technology integration dimension**

**Error! Reference source not found.** provides an overview of the performance in 2018 of Western Balkans economies and Turkey for the indicators that comprise the business technology integration dimension. Two Western Balkans economies (Montenegro and Serbia) were able to provide data for all the indicators, data from others was sparse. Information for 48 per cent of the cells in **Error! Reference source not found.** was received, this was the same as for the 2018 study.

**Table 5 Business technology integration dimension performance**

Indicator		EU Avg	AL	BA	ME	MK	RS	TR	XK
Indicators for which data available			4	0	8	2	8	2	3
4A.1 Electronic Information Sharing % <sup>ME XK</sup>	34%		38%		39%		36%		10%
4A.1B Business Connectivity %	97%		95%		96%	82%	99%	95%	
4A.3 Social Media % <sup>ME TK</sup>	21%		52%		24%		19%	46%	
4A.4 eInvoices %	23%				42%		18%		
4A.5 Cloud %	26%		11%		18%	11%	16%		
4B.1 SMEs Selling Online % <sup>XK</sup>	17%				10%		26%		21%
4B.2 eCommerce Turnover % <sup>XK</sup>	10%				2%		20%		6%
4B.3 Selling Online Cross-border % <sup>ME</sup>	8%				10%		8%		

ME TK 2017; XK 2016

Comparison with other dimensions clearly shows that business technology integration is the area where Western Balkans economies are performing best in comparison with EU28 Member States. 82 per cent of data points provided are above EU28 average levels or within ten per cent. This high level of performance was not evident in the 2018 study despite the fact more data was provided. In the 2018 study only 41 per cent of data points were within ten per cent or above the EU28 benchmark.

The two Western Balkans economies providing data for all indicators (Montenegro and Serbia) are performing within ten per cent or above the EU28 level for all eight indicators.

## 2.6. Digital public services dimension

The digital public services dimension is comprised of five indicators that examine the digitisation of public services, focusing on eGovernment, see Figure 7.

5 Digital public services	eGovernment development index (5A)	People interacting with public authorities over the internet (5A.1)
		Data pre-filled in online public services forms (5A.2)
		Steps in a public services interaction completed online (5A.3)
		Open data (5A.4)
	eHealth (5B)	*People using eHealth services (5B.1)

Figure 7 Digital public services dimension indicators

**Error! Reference source not found.** provides an overview of the performance in 2018 of Western Balkans economies and Turkey for the indicators that comprise the digital public services dimension. Serbia provided data for more than one of the indicators shown in **Error! Reference source not found.** Information for only 16 per cent of the cells in **Error! Reference source not found.** was received, this is a small increase on the 2018 study (11 per cent).

Table 6 Digital public services dimension performance

Indicator	EU Avg	AL	BA	ME	MK	RS	TR	XK
Indicators for which data available		2	1	2	2	6	2	1
5A.1 eGovernment Users % <sup>TK</sup>	59%			9%	21%	16%	42%	
5A.2 Pre-filled Forms	53%	62%				32%		
5A.3 Online Service Completion	86					63		
5A.4 eGovernment Services for Businesses	83					65		
5A.4 Open Data %	92%	67%	57%	70%	57%	78%	53%	52%
5B.1 eHealth %	18%					9%		

<sup>TK</sup> 2017

The limited data provided reveals that Western Balkans economies are generally performing below EU28 averages. Open data statistics were collected by the study team from the Open Data foundation<sup>24</sup>. EU28 Member States perform very well on the latest index (2016) of data for 115 countries, nine of the leading 20 countries are Member States. Western Balkans economies below the EU28 average, but several are above the global average of 65%.

<sup>24</sup> <https://opendatabarometer.org/4thedition/data/>

## 2.7. Telephony and market revenue dimension

The telephony and market revenue dimension is comprised of six indicators that examine fixed and mobile telephony subscriptions and operator market shares, also focusing on market revenue and investment, see Figure 8.

6 Telephony and market revenue	Fixed Telephony (6A)	Fixed lines (6A.1)
		Fixed telephony market share (6A.2)
	Mobile Telephony (6B)	Mobile subscribers (6B.1)
		Mobile telephony market share (6B.2)
	Market Revenue & Investment (6C)	Investment (6C.1)

**Figure 8 Telephony and market revenue dimension indicators**

**Error! Reference source not found.** provides an overview of the performance in 2018 of Western Balkans economies and Turkey for the indicators that comprise the telephony and market revenue dimension. Most economies had been collecting information for many years for previous ITU and EU studies. Receipt of 89 per cent of data (in the 2018 study the figure was 91 per cent) is therefore not surprising. Complete information was provided by three Western Balkans economies and Turkey. This could indicate that in future years, when the collection and validation of DESI indicators are well established, similar comprehensive levels of information will be provided.

**Table 7 Telephony and market revenue dimension performance**

Indicator	EU Avg	AL	BA	ME	MK	RS	TR	XK
Indicators for which data available		4	4	5	3	5	5	5
6A.1 Fixed Lines	42%	9%	22%	28%	18%	38%	14%	3%
6A.2 Fixed Telephony Market Share %	52%	71%	86%	66%	56%	80%	84%	54%
6B.1 Mobile subscribers	121	95	98	182	99	120	98	108
6B.2 Mobile Telephony Market Share %	34%		47%	35%		45%	48%	50%
6C.1 Investment %	13%	19%		38%		19%	16%	21%

EU 2016; 6C.1 2015

Provision of fixed telephone lines in most economies is below EU28 average levels. Technological development of mobile telephony and broadband provision (through 3G, 4G and 5G) could mean that EU28 average may never be reached since mobile technologies provide adequate substitutes.

Montenegro and Serbia have mobile subscriber numbers above or very close to EU28 average. Mobile telephony market shares are likely to be higher than the EU28 average because most economies only have three (or less) Mobile Network Operators and there are relatively few Mobile Virtual Network Operators.

Investment as a percentage of revenue in most economies shows some volatility between 2013 and 2018, for example Montenegro grew from 23 per cent in 2015 to 50 per cent in 2016. All economies had investment levels higher than the EU28 average.

### 3. Conclusions

This study continues the methodology and presentation methods adopted in the 2018 report, which provided a major overhaul of the methodology for monitoring market development for electronic communications and digital services in the Western Balkans economies and Turkey. Last year's study (2018) mainly presented data for 2016, with some indicators for 2017. The timeliness of data provision has improved; most economies were able to provide data for 2017 and 2018 in this report.

The study developed six thematic dimensions, comprised of 40 indicators for performance monitoring. The thematic dimensions include Digital Economy and Society Index (DESI) and associated indicators. Indicators in this report are closely aligned with, but not always exactly the same as DESI.

The traffic light style categorisation adopted for the first time last year has been well received due to its ability to provide an immediate overview of performance relative to EU28 Member States. Green shading in tables indicates performance at or above the average performance of EU28 Member States. Red indicates considerable room for improvement.

The study has adopted a very concise approach. The main body of this report, providing an overview of the performance of economies for dimensions and indicators is only 11 pages. Nearly 50 pages of annexes provide 'easy to search' insights to the performance of economies and to each indicator.

60 per cent of data requested has been provided by relevant organisations, this is the same as the last report. Support from the European Commission and Eurostat has been provided. A DESI workshop for regulators, government officials and representatives from Statistical Agencies was provided in March 2019. The one-day workshop highlighted that it usually takes about two years to pilot, collect, validate and analyse new statistics. It is therefore hoped that data provision will improve in future years.

There has been improved performance between last year's study and this study by five economies, which have increased the percentage of indicators meeting or exceeding the EU28 average. In addition, all economies have decreased the number of indicators over 20 per cent below the EU28 average level.

## Annex 1: Dimensions and indicators

This annex provides a pictorial overview of the six dimensions that underpin the study. The 40 indicators that comprise the six dimensions are also described. The code, used in chapter 2 to describe each indicator is also presented. Results for all indicators can be cross-referenced by referring to the code in Annex 3.

1 Connectivity	Fixed broadband (1A)	Fixed broadband coverage (1A.1) Fixed broadband subscriptions (1A.2)
	Mobile broadband (1B)	4G coverage (1B.1) Mobile broadband subscriptions (1B.2)
	Speed (1C)	Coverage of high-speed networks (>30 Mbps) (1C.1) Subscriptions to fixed high speed broadband (>30 Mbps) (1C.2) Ultrafast coverage (1D.1) 100Mbps take-up (1D.2)
	Affordability (1E)	Fixed broadband price (1E.1)
2 Digital skills	Basic skills and usage (2A)	Internet users (2A.1) Individuals never having used the internet (2A.1B)
	Advanced skills and development (2B)	Individuals with at least basic skills (2B.1) Share of ICT specialists in the workforce (2B.2) Graduates in STEM (2B.3)
3 Citizen use of Internet	Content (3A)	News (3A.1) Music, video and games (3A.2) Video on-demand (3A.3)
	Communications (3B)	Video calls (3B.1) Social networks (3B.2)
	Transactions (3C)	Banking (3C.1)
4 Business technology integration	Business digitisation (4A)	Enterprises sharing internal information electronically (4A.1) Business connectivity (4A.1B) Enterprises using social media (4A.3) Enterprises sending and/or receiving invoices (4A.4) Enterprises using Cloud (4A.5)
		SMEs selling online (4B.1) Turnover from eCommerce (4B.2) SMEs selling online cross-border (4B.3)
	eCommerce (4B)	
5 Digital public services	eGovernment development index (5A)	People interacting with public authorities over the internet (5A.1) Data pre-filled in online public services forms (5A.2) Steps in a public services interaction completed online (5A.3) Open data (5A.4)
	eHealth (5B)	*People using eHealth services (5B.1)
6 Telephony and market revenue	Fixed Telephony (6A)	Fixed lines (6A.1) Fixed telephony market share (6A.2)
	Mobile Telephony (6B)	Mobile subscribers (6B.1) Mobile telephony market share (6B.2)
	Market Revenue & Investment (6C)	Investment (6C.1)



## Annex 2: Economy overviews

This annex provides an individual performance overview for each of the Western Balkans economies and Turkey examined in this study.

The introduction to each economy is a table examining overall economy performance in providing data and performance relative to the EU average for last year's 2018 study and this (2019) study. This enables overall change to be better understood. The proportion of red cells (indicating performance above the EU28 average) and green cells (indicating performance 20 per cent or more below the EU28 average) is calculated according to the number of cells for which information has been provided by each economy.

The performance for each indicator, derived from the overview tables in chapter 2 is then presented<sup>25</sup>. Data from the last study (2018) is provided, where available, to enable comparison. The shading system for each indicator follows the traffic lights categorisation system used throughout the study. The 2019 EU average relates to the latest EU28 Member State data, generally for 2018<sup>26</sup>.

An overview of performance for all economies is provided below.

	2018 indicators provided	2019 indicators provided	2018 Cells above EU average	2019 Cells above EU average	2018 Cells 20 per cent or more below EU avg.	2019 Cells 20 per cent or more below EU avg.
AL	14%	48%	20%	21%	60%	58%
BA	24%	18%	22%	14%	78%	71%
ME	70%	83%	38%	36%	46%	30%
MK	81%	58%	10%	26%	70%	48%
RS	89%	100%	33%	38%	48%	28%
TR	78%	55%	7%	9%	71%	64%
XK	62%	60%	22%	38%	57%	42%
Average	60%	60%	22%	29%	60%	43%

The table reveals consistency in data provision (60 per cent) in both studies. There has been a seven per cent increase, to 29 per cent, in the number of data points indicating performance above the EU average level. The table also reveals that the proportion of data points indicating performance considerably below EU levels (over 20 per cent) is decreasing - from 60 per cent in the 2018 study to 43 per cent in this study.

<sup>25</sup> Information in this report usually relates to statistics for 2018. Data presented in the 2018 report generally related to 2016.

<sup>26</sup> 2018 report shading relates to the relevant EU average, generally for 2016. At first sight some shading for 2018 may appear at variance with the EU28 average, but it must be remembered the E28 average generally relates to 2018. Figure 2 records data provision each year for 2016, 2017 and 2018. Tables in Section 2 also include statistics from previous years where there are gaps in provision. For this reason the count of indicators available may reveal some differences with totals provided in Figure 2, Section 2 and Annex 2.

# Albania

	2018 Study	2019 Study
Cells for which information provided (%; indicators)	14% (6)	48% (19)
Cells provided that are above the EU28 average	20% (1)	21% (4)
Cells provided 20 per cent or more below EU28 avg.	60% (3)	58% (11)

Indicator	2018	2019
	6	19
<b>1. Connectivity</b>		
Indicators for which data available	2	8
EU Avg 2019		
1A.1 Fixed BB Coverage %	97%	13%
1A.2 Fixed BB Take-up %	76%	9%
1B.1 4G Coverage %	91%	87%
1B.2 Mobile BB Take-up (per 100 pop)	90	54
1C.1 NGA Coverage %	80%	14%
1C.2 Fast BB Take-up	34%	4%
1D.1 Ultrafast BB Coverage	57%	0%
1D.2 Ultrafast BB Take-up %	15%	1%
1E.1 Broadband Price Index	87	
<b>2 Digital Skills</b>		
Indicators for which data available	0	1
2A.1 Internet Users %	81%	72%
2A.1B Individuals Not Using the Internet %	13%	
2A.2 At least Basic Digital Skills %	57%	
2B.1 ICT Specialists %	4%	
2B.2 STEM Graduates	19%	
<b>3 Citizen Internet use</b>		
Indicators for which data available	0	0
3A.1 News %	73%	
3A.2 Music, Videos and Games %	78%	
3A.3 Videos on Demand %	21%	
3B.1 Video Calls %	46%	
3B.2 Social Networks %	65%	
3C.1 Banking %	61%	
3C.2 Shopping %	68%	
<b>4 Business technology Integration</b>		
Indicators for which data available	0	4
EU Avg 2019		
4A.1 Electronic Information Sharing %	34%	38%
4A.1B Business Connectivity %	97%	95%
4A.3 Social Media %	21%	52%
4A.4 eInvoices %	23%	
4A.5 Cloud %	26%	11%
4B.1 SMEs Selling Online %	17%	
4B.2 eCommerce Turnover %	10%	
4B.3 Selling Online Cross-border %	8%	
<b>5. Digital public services</b>		
Indicators for which data available	0	2
5A.1 eGovernment Users %	59%	
5A.2 Pre-filled Forms	53%	62%
5A.3 Online Service Completion	86	
5A.4 Open Data %	91%	67%
5B.1 eHealth %	18%	
<b>6 Telephony and market revenue</b>		
Indicators for which data available	4	4
6A.1 Fixed Lines	42%	9%
6A.2 Fixed Telephony Market Share %	52%	59%
6B.1 Mobile subscribers	121	130
6B.2 Mobile Telephony Market Share %	34%	45%
6C.1 Investment %	13%	19%



# Bosnia & Herzegovina

	2018 Study	2019 Study
Cells for which information provided (%; indicators)	24% (8)	18% (7)
Cells provided that are above the EU28 average	22% (2)	14% (1)
Cells provided 20 per cent or more below EU28 avg.	78% (7)	71% (5)

Indicator	2018	2019
	8	7
<b>1. Connectivity</b>		
Indicators for which data available	2	1
EU Avg 2019		
1A.1 Fixed BB Coverage %	97%	
1A.2 Fixed BB Take-up %	76%	17%
1B.1 4G Coverage %	91%	18%
1B.2 Mobile BB Take-up (per 100 pop)	90	45
1C.1 NGA Coverage %	80%	
1C.2 Fast BB Take-up	34%	
1D.1 Ultrafast BB Coverage	57%	n/c
1D.2 Ultrafast BB Take-up %	15%	n/c
1E.1 Broadband Price Index	87	
<b>2 Digital Skills</b>		
Indicators for which data available	1	1
2A.1 Internet Users %	81%	83%
2A.1B Individuals Not Using the Internet %	13%	90%
2A.2 At least Basic Digital Skills %	57%	
2B.1 ICT Specialists %	4%	
2B.2 STEM Graduates	19%	
<b>3 Citizen Internet use</b>		
Indicators for which data available	0	0
3A.1 News %	73%	
3A.2 Music, Videos and Games %	78%	
3A.3 Videos on Demand %	21%	
3B.1 Video Calls %	46%	
3B.2 Social Networks %	65%	
3C.1 Banking %	61%	
3C.2 Shopping %	68%	
<b>4 Business technology integration</b>		
Indicators for which data available	0	0
4A.1 Electronic Information Sharing %	34%	
4A.1B Business Connectivity %	97%	
4A.3 Social Media %	21%	
4A.4 eInvoices %	23%	
4A.5 Cloud %	26%	
4B.1 SMEs Selling Online %	17%	
4B.2 eCommerce Turnover %	10%	
4B.3 Selling Online Cross-border %	8%	
<b>5. Digital public services</b>		
Indicators for which data available	0	1
5A.1 eGovernment Users %	59%	
5A.2 Pre-filled Forms	53%	
5A.3 Online Service Completion	86	
5A.4 Open Data %	91%	57%
5B.1 eHealth %	18%	n/c
<b>6 Telephony and market revenue</b>		
Indicators for which data available	5	4
6A.1 Fixed Lines	42%	23%
6A.2 Fixed Telephony Market Share %	52%	88%
6B.1 Mobile subscribers	121	96
6B.2 Mobile Telephony Market Share %	34%	98
6C.1 Investment %	13%	47%
		13%

n/c not collected in 2018 study

# Montenegro

	2018 Study	2019 Study
Cells for which information provided (%; indicators)	70% (25)	82% (32)
Cells provided that are above the EU28 average	38% (10)	36% (12)
Cells provided 20 per cent or more below EU28 avg.	46% (12)	30% (10)

Indicator	2018	2019
	25	32
<b>1. Connectivity</b>		
Indicators for which data available	7	8
EU Avg 2019		
1A.1 Fixed BB Coverage %	97%	80%
1A.2 Fixed BB Take-up %	76%	19%
1B.1 4G Coverage %	91%	78%
1B.2 Mobile BB Take-up (per 100 pop)	90	61
1C.1 NGA Coverage %	80%	28%
1C.2 Fast BB Take-up	34%	7%
1D.1 Ultrafast BB Coverage	57%	n/c
1D.2 Ultrafast BB Take-up %	15%	n/c
1E.1 Broadband Price Index	87	17.8

<b>2 Digital Skills</b>		
Indicators for which data available	2	3
2A.1 Internet Users %	81%	68%
2A.1B Individs Not Using the Internet %	13%	25%
2A.2 At least Basic Digital Skills %	57%	50%
2B.1 ICT Specialists %	4%	
2B.2 STEM Graduates	19%	

<b>3 Citizen Internet use</b>		
Indicators for which data available	5	6
3A.1 News %	73%	53%
3A.2 Music, Videos and Games %	78%	21%
3A.3 Videos on Demand %	21%	10%
3B.1 Video Calls %	46%	52%
3B.2 Social Networks %	65%	56%
3C.1 Banking %	61%	4%
3C.2 Shopping %	68%	25%

<b>4 Business technology integration</b>		
Indicators for which data available	5	8
4A.1 Electronic Information Sharing %	34%	41%
4A.1B Business Connectivity %	97%	97%
4A.3 Social Media %	21%	45%
4A.4 eInvoices %	23%	42%
4A.5 Cloud %	26%	35%
4B.1 SMEs Selling Online %	17%	10%
4B.2 eCommerce Turnover %	10%	2%
4B.3 Selling Online Cross-border %	8%	10%

<b>5. Digital public services</b>		
Indicators for which data available	1	2
5A.1 eGovernment Users %	59%	22%
5A.2 Pre-filled Forms	53%	9%
5A.3 Online Service Completion	86	
5A.4 Open Data %	91%	70%
5B.1 eHealth %	18%	n/c

<b>6 Telephony and market revenue</b>		
Indicators for which data available	5	5
6A.1 Fixed Lines	42%	24%
6A.2 Fixed Telephony Market Share %	52%	91%
6B.1 Mobile subscribers	121	165
6B.2 Mobile Telephony Market Share %	34%	37%
6C.1 Investment %	13%	50%

n/c not collected in 2018 study

# North Macedonia

	2018 Study	2019 Study
Cells for which information provided (%; indicators)	81% (28)	58% (23)
Cells provided that are above the EU28 average	10% (3)	26% (6)
Cells provided 20 per cent or more below EU28 avg.	70% (21)	48% (11)

Indicator		2018	2019
		28	23
<b>1. Connectivity</b>			
Indicators for which data available		5	7
EU Avg 2019			
1A.1 Fixed BB Coverage %	97%	41%	98%
1A.2 Fixed BB Take-up %	76%	18%	66%
1B.1 4G Coverage %	91%		100%
1B.2 Mobile BB Take-up (per 100 pop)	90	59	69
1C.1 NGA Coverage %	80%	50%	50%
1C.2 Fast BB Take-up	34%	13%	21%
1D.1 Ultrafast BB Coverage	57%	n/c	
1D.2 Ultrafast BB Take-up %	15%	n/c	1%
1E.1 Broadband Price Index	87		
<b>2 Digital Skills</b>			
Indicators for which data available		5	3
2A.1 Internet Users %	81%	70%	78%
2A.1B Individuals Not Using the Internet %	13%	23%	18%
2A.2 At least Basic Digital Skills %	57%	34%	
2B.1 ICT Specialists %	4%	15%	12%
2B.2 STEM Graduates	19%	7%	
<b>3 Citizen Internet use</b>			
Indicators for which data available		6	6
3A.1 News %	73%	47%	65%
3A.2 Music, Videos and Games %	78%	58%	
3A.3 Videos on Demand %	21%	9%	12%
3B.1 Video Calls %	46%	54%	76%
3B.2 Social Networks %	65%	60%	82%
3C.1 Banking %	61%	9%	12%
3C.2 Shopping %	68%		32%
<b>4 Business technology integration</b>			
Indicators for which data available		6	2
4A.1 Electronic Information Sharing %	34%		
4A.1B Business Connectivity %	97%	94%	82%
4A.3 Social Media %	21%	16%	
4A.4 eInvoices %	23%	6%	
4A.5 Cloud %	26%	4%	11%
4B.1 SMEs Selling Online %	17%		
4B.2 eCommerce Turnover %	10%	2%	
4B.3 Selling Online Cross-border %	8%	1%	
<b>5. Digital public services</b>			
Indicators for which data available		1	2
5A.1 eGovernment Users %	59%	17%	21%
5A.2 Pre-filled Forms	53%		
5A.3 Online Service Completion	86		
5A.4 Open Data %	91%		57%
5B.1 eHealth %	18%	n/c	
<b>6 Telephony and market revenue</b>			
Indicators for which data available		5	3
6A.1 Fixed Lines	42%	17%	18%
6A.2 Fixed Telephony Market Share %	52%	59%	56%
6B.1 Mobile subscribers	121	98	99
6B.2 Mobile Telephony Market Share %	34%	50%	
6C.1 Investment %	13%	19%	

n/c not collected in 2018 study

# Serbia

	2018 Study	2019 Study
Cells for which information provided (%; indicators)	89% (32)	100% (39)
Cells provided that are above the EU28 average	33% (11)	38% (15)
Cells provided 20 per cent or more below EU28 avg.	48% (16)	28% (11)

Indicator	2018	2019
	32	39
<b>1. Connectivity</b>		
Indicators for which data available	5	9
EU Avg 2019		
1A.1 Fixed BB Coverage %	97%	69% 72%
1A.2 Fixed BB Take-up %	76%	21% 62%
1B.1 4G Coverage %	91%	66% 96%
1B.2 Mobile BB Take-up (per 100 pop)	90	72 83
1C.1 NGA Coverage %	80%	68%
1C.2 Fast BB Take-up	34%	44%
1D.1 Ultrafast BB Coverage	57%	n/c 67%
1D.2 Ultrafast BB Take-up %	15%	n/c 2%
1E.1 Broadband Price Index	87	15.6 57
<b>2 Digital Skills</b>		
Indicators for which data available	5	5
2A.1 Internet Users %	81%	67% 73%
2A.1B Individuals Not Using the Internet %	13%	29% 24%
2A.2 At least Basic Digital Skills %	57%	67% 66%
2B.1 ICT Specialists %	4%	22% 2%
2B.2 STEM Graduates	19%	17% 18%
<b>3 Citizen Internet use</b>		
Indicators for which data available	7	7
3A.1 News %	73%	77% 78%
3A.2 Music, Videos and Games %	78%	62% 73%
3A.3 Videos on Demand %	21%	13% 23%
3B.1 Video Calls %	46%	46% 67%
3B.2 Social Networks %	65%	69% 70%
3C.1 Banking %	61%	19% 20%
3C.2 Shopping %	68%	38% 16%
<b>4 Business technology integration</b>		
Indicators for which data available	8	8
4A.1 Electronic Information Sharing %	34%	16% 36%
4A.1B Business Connectivity %	97%	99% 99%
4A.3 Social Media %	21%	36% 19%
4A.4 eInvoices %	23%	6% 18%
4A.5 Cloud %	26%	9% 16%
4B.1 SMEs Selling Online %	17%	23% 26%
4B.2 eCommerce Turnover %	10%	18% 20%
4B.3 Selling Online Cross-border %	8%	5% 8%
<b>5. Digital public services</b>		
Indicators for which data available	2	5
5A.1 eGovernment Users %	59%	24% 16%
5A.2 Pre-filled Forms	53%	32%
5A.3 Online Service Completion	86	63
5A.4 Open Data %	91%	50% 78%
5B.1 eHealth %	18%	n/c 9%
<b>6 Telephony and market revenue</b>		
Indicators for which data available	5	5
6A.1 Fixed Lines	42%	38% 38%
6A.2 Fixed Telephony Market Share %	52%	89% 80%
6B.1 Mobile subscribers	121	129 120
6B.2 Mobile Telephony Market Share %	34%	47% 45%
6C.1 Investment %	13%	17% 19%

n/c not collected in 2018 study

# Turkey

	2018 Study	2019 Study
Cells for which information provided (%; indicators)	78% (29)	55% (22)
Cells provided that are above the EU28 average	7% (2)	9% (2)
Cells provided 20 per cent or more below EU28 avg.	71% (21)	64% (14)

Indicator	2018	2019
	29	22
<b>1. Connectivity</b>		
Indicators for which data available	5	5
EU Avg 2019		
1A.1 Fixed BB Coverage %	97%	
1A.2 Fixed BB Take-up %	76%	13% 56%
1B.1 4G Coverage %	91%	84% 87%
1B.2 Mobile BB Take-up (per 100 pop)	90	65 75
1C.1 NGA Coverage %	80%	
1C.2 Fast BB Take-up	34%	5% 9%
1D.1 Ultrafast BB Coverage	57%	n/c
1D.2 Ultrafast BB Take-up %	15%	n/c 0%
1E.1 Broadband Price Index	87	37%
<b>2 Digital Skills</b>		
Indicators for which data available	4	4
2A.1 Internet Users %	81%	61% 73%
2A.1B Individuals Not Using the Internet %	13%	39% 33%
2A.2 At least Basic Digital Skills %	57%	28% 33%
2B.1 ICT Specialists %	4%	
2B.2 STEM Graduates	19%	12% 12%
<b>3 Citizen internet use</b>		
Indicators for which data available	8	4
3A.1 News %	73%	44% 44%
3A.2 Music, Videos and Games %	78%	50%
3A.3 Videos on Demand %	21%	2%
3B.1 Video Calls %	46%	24% 40%
3B.2 Social Networks %	65%	48%
3C.1 Banking %	61%	18% 23%
3C.2 Shopping %	68%	21% 25%
<b>4 Business technology integration</b>		
Indicators for which data available	6	2
4A.1 Electronic Information Sharing %	34%	14%
4A.1B Business Connectivity %	97%	94% 95%
4A.3 Social Media %	21%	38% 46%
4A.4 eInvoices %	23%	
4A.5 Cloud %	26%	10%
4B.1 SMEs Selling Online %	17%	11%
4B.2 eCommerce Turnover %	10%	
4B.3 Selling Online Cross-border %	8%	4%
<b>5. Digital public services</b>		
Indicators for which data available	1	2
5A.1 eGovernment Users %	59%	42% 42%
5A.2 Pre-filled Forms	53%	
5A.3 Online Service Completion	86	
5A.4 Open Data %	91%	53%
5B.1 eHealth %	18%	n/c
<b>6 Telephony and market revenue</b>		
Indicators for which data available	5	5
6A.1 Fixed Lines	42%	14% 14%
6A.2 Fixed Telephony Market Share %	52%	66% 84%
6B.1 Mobile subscribers	121	96 98
6B.2 Mobile Telephony Market Share %	34%	44% 46%
6C.1 Investment %	13%	16% 16%

n/c not collected in 2018 study

# Kosovo

	2018 Study	2019 Study
Cells for which information provided (%; indicators)	62% (21)	60% (24)
Cells provided that are above the EU28 average	22% (5)	38% (9)
Cells provided 20 per cent or more below EU28 avg.	57% (13)	42% (10)

Indicator	2018	2019
	21	24
<b>1. Connectivity</b>	6	8
Indicators for which data available		
EU Avg 2019		
1A.1 Fixed BB Coverage %	81%	100%
1A.2 Fixed BB Take-up %	13%	18%
1B.1 4G Coverage %	14%	89%
1B.2 Mobile BB Take-up (per 100 pop)	55	92
1C.1 NGA Coverage %	63%	97%
1C.2 Fast BB Take-up	20%	33%
1D.1 Ultrafast BB Coverage	n/c	9%
1D.2 Ultrafast BB Take-up %	n/c	
1E.1 Broadband Price Index	20.3	5
<b>2 Digital Skills</b>	3	3
Indicators for which data available		
2A.1 Internet Users %	62%	87%
2A.1B Individs Not Using the Internet %	13%	7%
2A.2 At least Basic Digital Skills %	32%	
2B.1 ICT Specialists %		1%
2B.2 STEM Graduates		
<b>3 Citizen Internet use</b>	3	4
Indicators for which data available		
3A.1 News %		
3A.2 Music, Videos and Games %		
3A.3 Videos on Demand %		
3B.1 Video Calls %	34%	85%
3B.2 Social Networks %	49%	64%
3C.1 Banking %	8%	1%
3C.2 Shopping %		3%
<b>4 Business technology integration</b>	4	3
Indicators for which data available		
4A.1 Electronic Information Sharing %	10%	10%
4A.1B Business Connectivity %	89%	
4A.3 Social Media %		
4A.4 eInvoices %		
4A.5 Cloud %		
4B.1 SMEs Selling Online %	21%	21%
4B.2 eCommerce Turnover %	6%	6%
4B.3 Selling Online Cross-border %		
<b>5. Digital public services</b>	0	1
Indicators for which data available		
5A.1 eGovernment Users %		
5A.2 Pre-filled Forms		
5A.3 Online Service Completion		
5A.4 Open Data %		52%
5B.1 eHealth %		
<b>6 Telephony and market revenue</b>	5	5
Indicators for which data available		
6A.1 Fixed Lines	3%	3%
6A.2 Fixed Telephony Market Share %	80%	54%
6B.1 Mobile subscribers	111	108
6B.2 Mobile Telephony Market Share %	60%	50%
6C.1 Investment %	18%	21%

n/c not collected in 2018 study



## ***Annex 3: Indicator overviews***

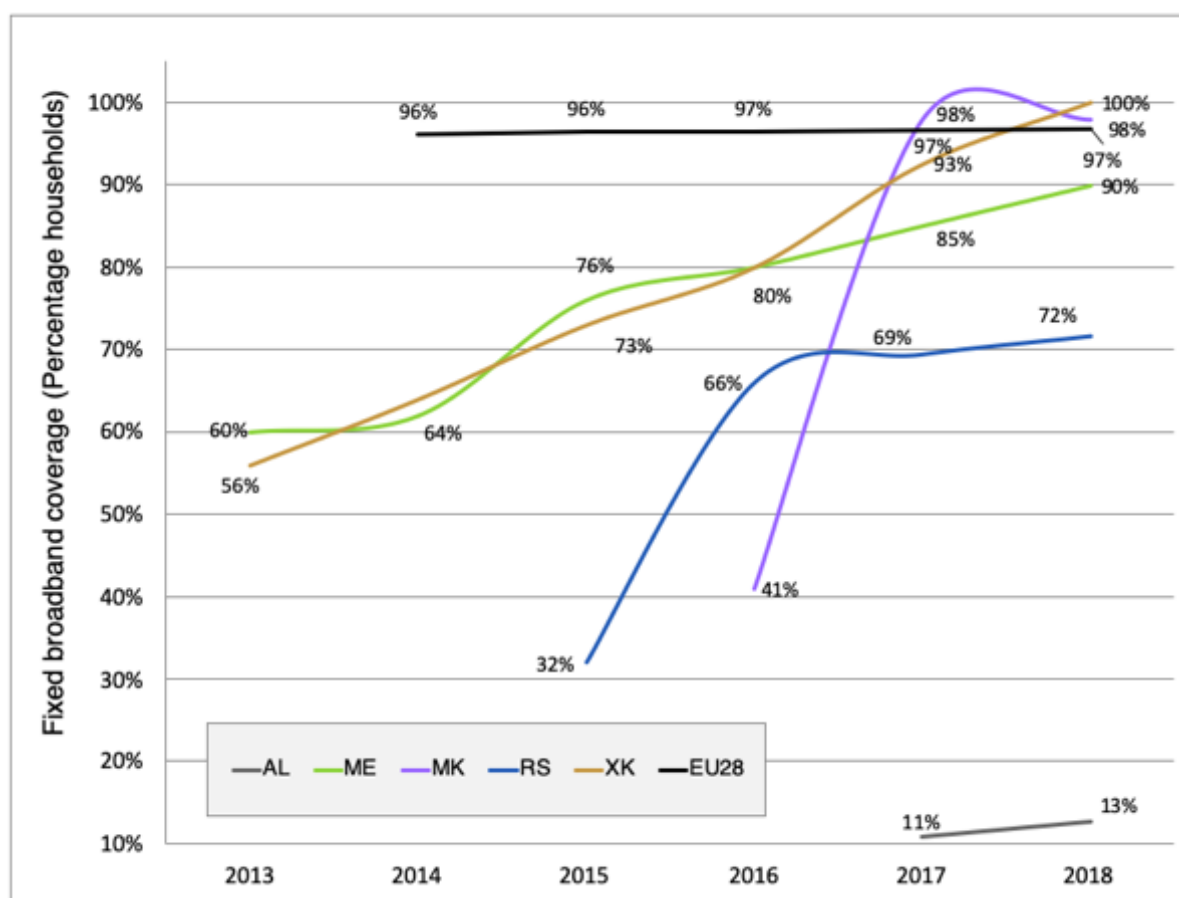
This annex provides an overview of performance between 2013 and 2018, where data is available, for the six dimensions utilised in the study. For ease of cross-referencing indicators are indexed according to the code for each indicator used in chapter 2 and Annex 1.

Indicators are provided in alpha-numerical order. Thus the first indicator provided overleaf is 1A.1 – Fixed broadband coverage. This is followed by 1A.2 Subscriptions to fixed broadband etc.



## 1. The connectivity dimension

### 1A.1 Coverage of fixed broadband



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Fixed broadband coverage<sup>27</sup> information was provided by five Western Balkans economies (Montenegro, North Macedonia, Serbia, Kosovo and Albania). EU28 coverage has virtually plateaued since 2014. Increasing broadband coverage by Western Balkans economies has therefore moved their position closer to the EU28 average. Most notably North Macedonia (98 per cent) and Kosovo (100 per cent) which exceeded the EU average in 2018. Montenegro has also made progress, increasing from 60 per cent in 2013 to 90 per cent in 2018.

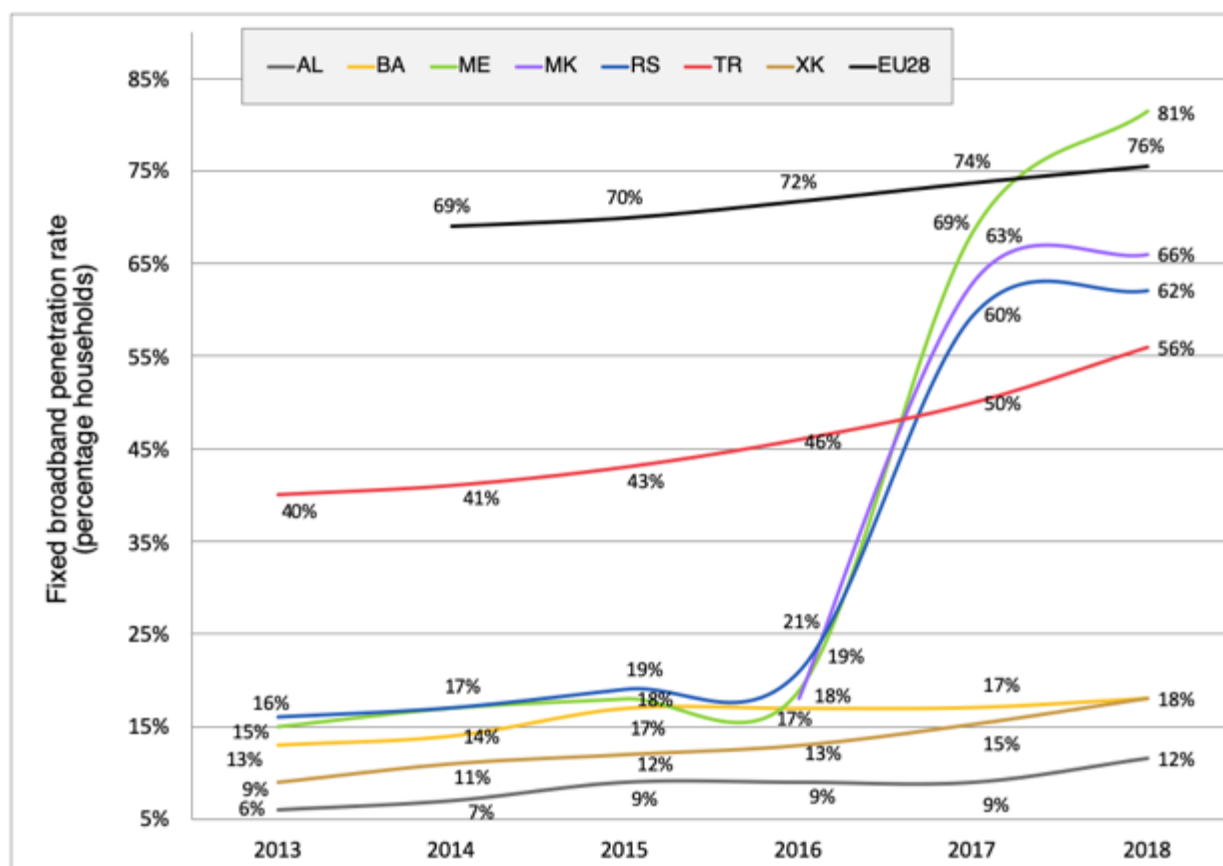
Albania (13 per cent) recorded the lowest fixed broadband coverage in 2018, significantly below all other economies. Serbia (72 per cent) recorded as the second lowest in 2018, however, has made significant increase between 2015 and 2018 with coverage increasing from 32 to 72 per cent.

<sup>27</sup> Percentage of households covered by broadband: xDSL, cable (basic and NGA), FTTP or WiMax networks – all households, percentage of households.



## 1. The connectivity dimension

### 1A.2 Subscriptions to fixed broadband



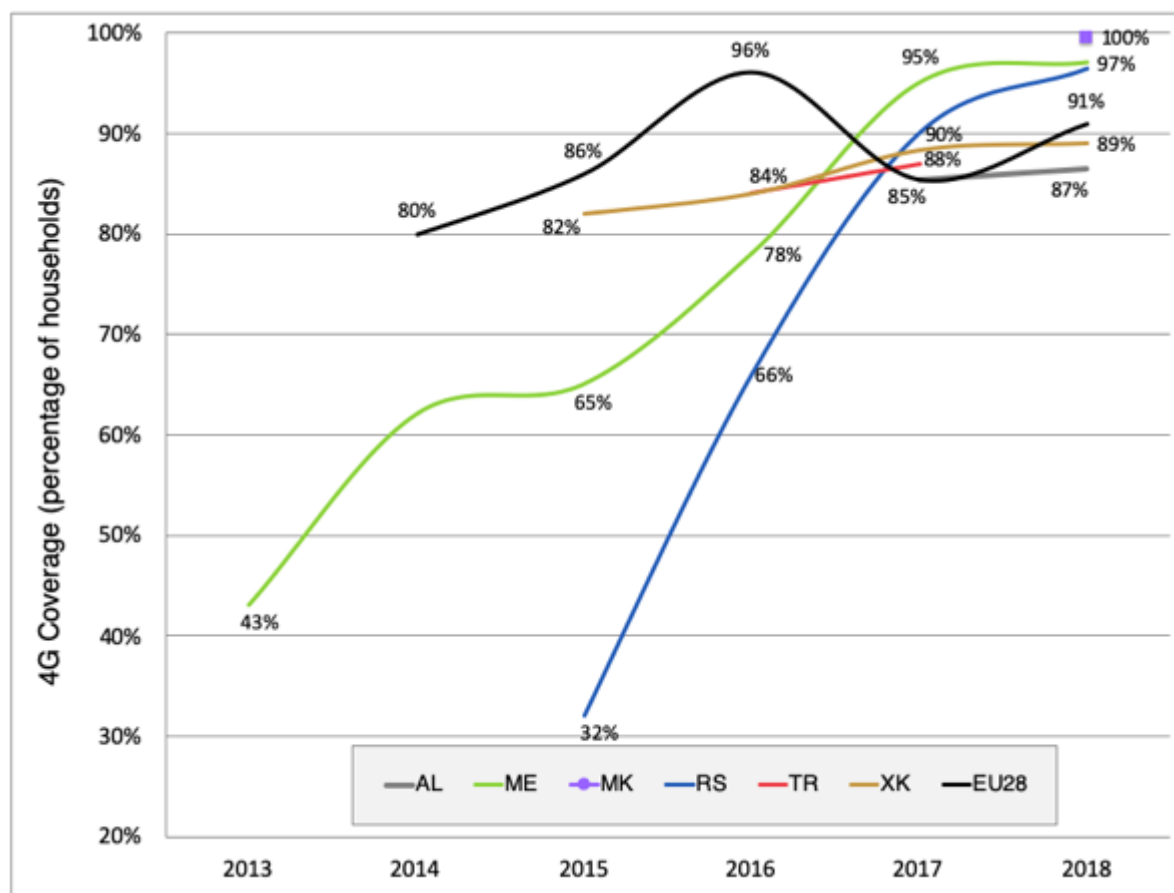
Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

All of the six Western Balkans economies and Turkey provided data about subscriptions to fixed broadband. All of these economies but Montenegro for this indicator, score lower than the EU Member States between 2013 and 2018.

Three economies have undergone considerable increases between 2016 and 2018. Serbia, North Macedonia and Montenegro rose from approximately 20 per cent to 62, 66 and 81 per cent respectively. Turkey's steady growth continued and penetration rose to 56 per cent in 2018.

## 1. The connectivity dimension

### 1B.1 4G coverage



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

4G coverage<sup>28</sup> has been reported by six of the examined economies (Albania, Montenegro, North Macedonia, Serbia, Turkey and Kosovo).

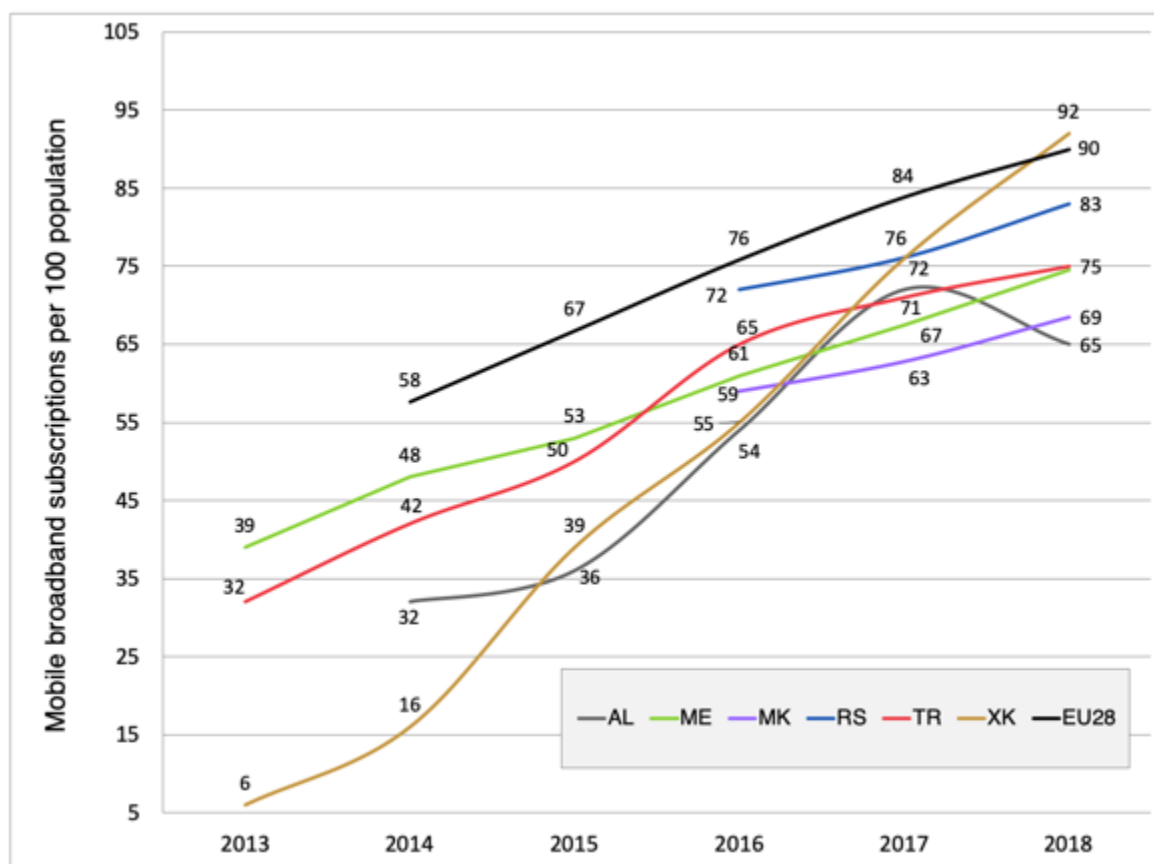
North Macedonia is the highest performing Western Balkans economy, reporting 100 per cent 4G coverage in 2018. Increasing coverage Serbia (96 per cent) and Montenegro (97 per cent) has led these two economies to higher coverage than the EU28 benchmark of 91 per cent. Serbia saw a dramatic increase in 4G coverage from 32 per cent to 97 per cent between 2015 and 2018.

Kosovo has seen a steady increase from 2015 to 2018 from 82 per cent to 89 percent, almost meeting the EU benchmark.

<sup>28</sup> Percentage of populated areas covered by 4G – measured as the average coverage of telecom operators in each country – all subscriptions, percentage of households.

## 1. The connectivity dimension

### 1B.2 Subscriptions to mobile broadband



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

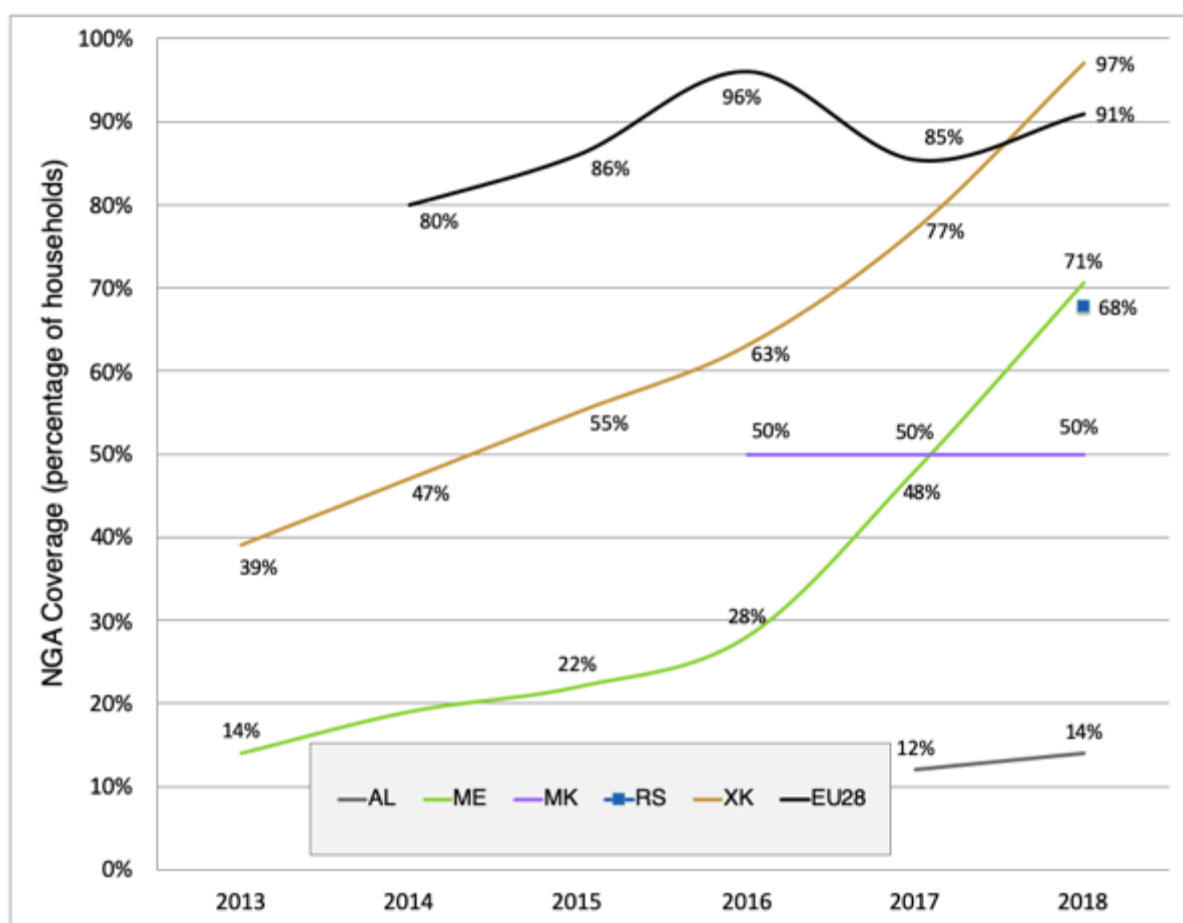
Mobile broadband subscriptions<sup>29</sup> information was provided by five of the Western Balkans economies (Albania, Montenegro, Serbia, North Macedonia and Kosovo) and Turkey. All economies have shown increases from 2013 to 2018, with the exception of Albania which fell from 72 subscriptions per 100 population in 2017 to 65 in 2018.

In 2018 Kosovo had the highest proportion of mobile broadband 92 subscriptions per 100 population, followed by Serbia (83), Turkey and Montenegro (75), North Macedonia (69) and Albania (65). With the exception of Kosovo, these subscription levels are less than the EU28 Member States in the same year – 90 subscriptions per 100 population.

<sup>29</sup> Number of mobile data subscriptions per 100 people – all subscriptions; subscribers per 100 people

## 1. The connectivity dimension

### 1C.1 Coverage of high-speed networks (>30 Mbps)



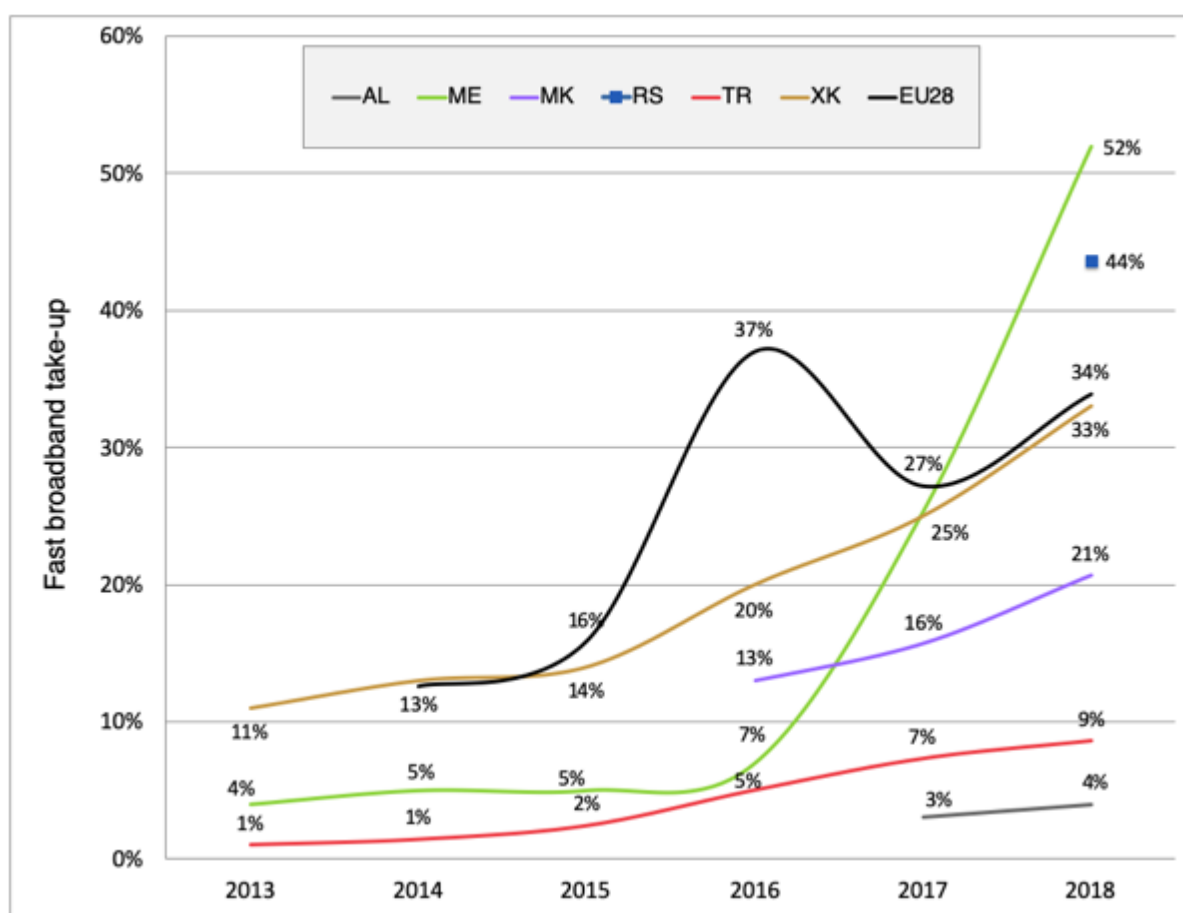
Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Five of the Western Balkans economies shared results for coverage of high-speed networks (Albania, Montenegro, North Macedonia, Serbia and Kosovo). For all of these economies, results for this indicator are significantly lower than EU28 Member States between 2013 and 2018, with the exception of Kosovo (97 per cent) which scored 6 per cent more than the EU28 (91 per cent) benchmark in 2018.

Between 2016 and 2018 the Balkans countries experienced an overall increase in NGA coverage. The EU however experienced a decrease from 96 to 91 per cent over the same time period. Excluding Kosovo, the numbers have been significantly less in the observed economies compared to the EU average (91 per cent) – Montenegro (71 per cent), Serbia (68 per cent) North Macedonia (50 per cent) and Albania (14 per cent).

## 1. The connectivity dimension

### 1C.2 Subscriptions to fixed high-speed broadband (>30 Mbps)



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

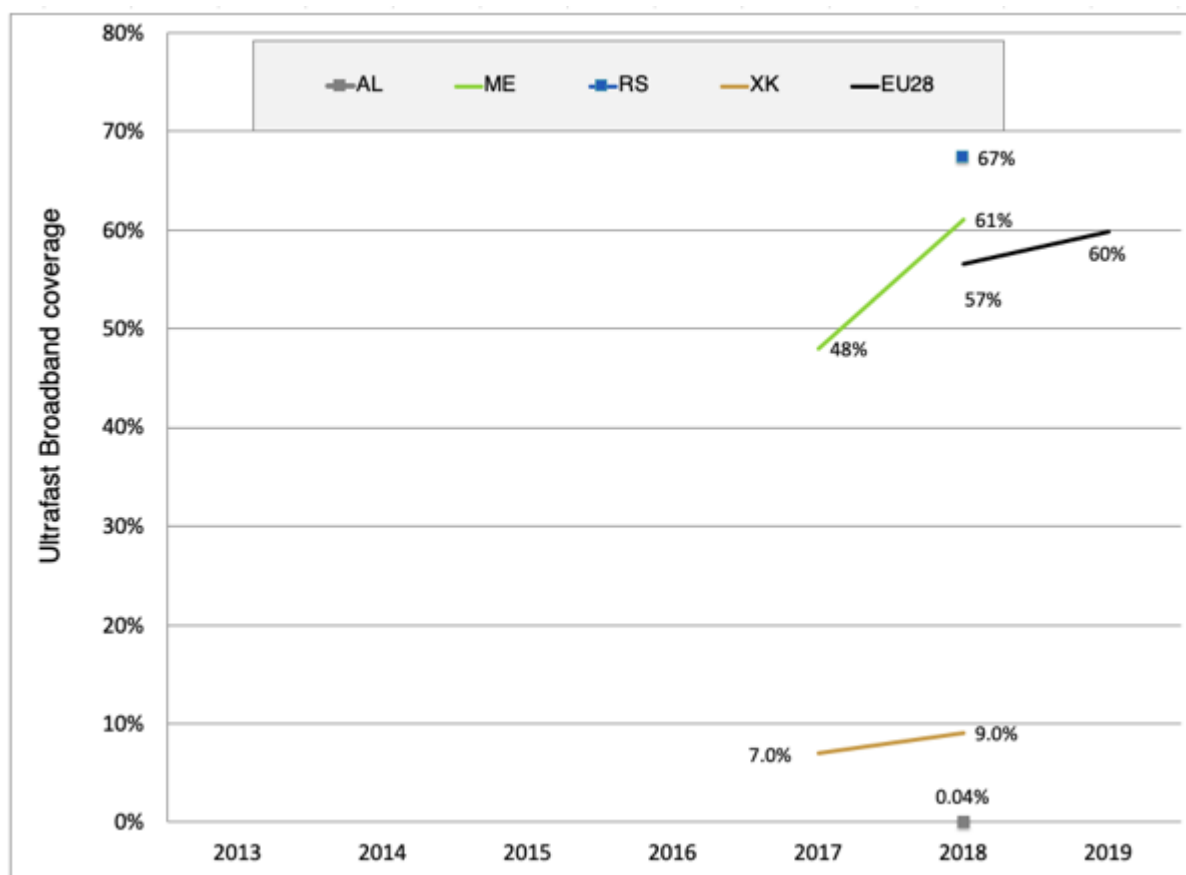
Subscriptions to fixed high-speed broadband<sup>30</sup> has been reported by five of the Western Balkans economies and Turkey between 2013 and 2018. Montenegro (52 per cent) and Serbia (44 per cent) performed better than the 34 per cent EU28 benchmark in 2018.

The remaining economies performed lower than the EU28 benchmark, Kosovo's steady increase in take up has taken it to within one per cent of the EU average.

<sup>30</sup> Share of fixed broadband subscriptions > 30Mbps – all fixed broadband subscriptions; percentage of subscriptions > = 30 Mbps

## 1. The connectivity dimension

### 1D.1 Ultrafast coverage



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Ultrafast broadband coverage and take up was not collected in the 2018 study. Indeed, EU28 data is only available for 2018 and 2019. It is not therefore surprising that there is a paucity of data from the Western Balkans economies.

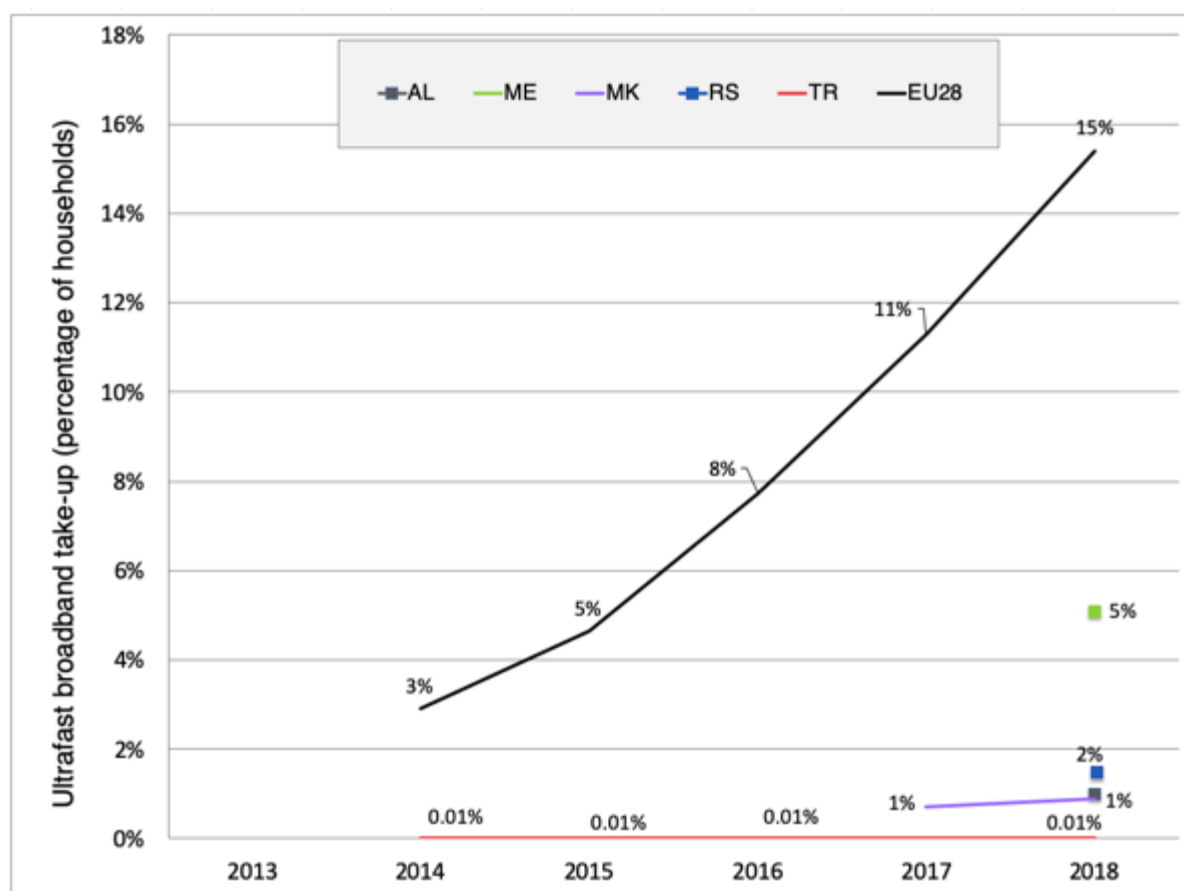
Ultrafast coverage<sup>31</sup> data was only provided by four Balkans economies (Albania, Montenegro, Serbia and Kosovo). Serbia has the greatest level of ultrafast coverage with 67 per cent, followed by Montenegro (61 per cent), both have coverage higher than the EU28 average (57 per cent) in 2018.

Kosovo and Albania display the lowest levels of ultrafast coverage, both of which are well below the EU28 benchmark with 9 per cent and 0.04 per cent respectively.

<sup>31</sup> 100Mbps and above

## 1. The connectivity dimension

### 1D.2 Ultrafast broadband take-up



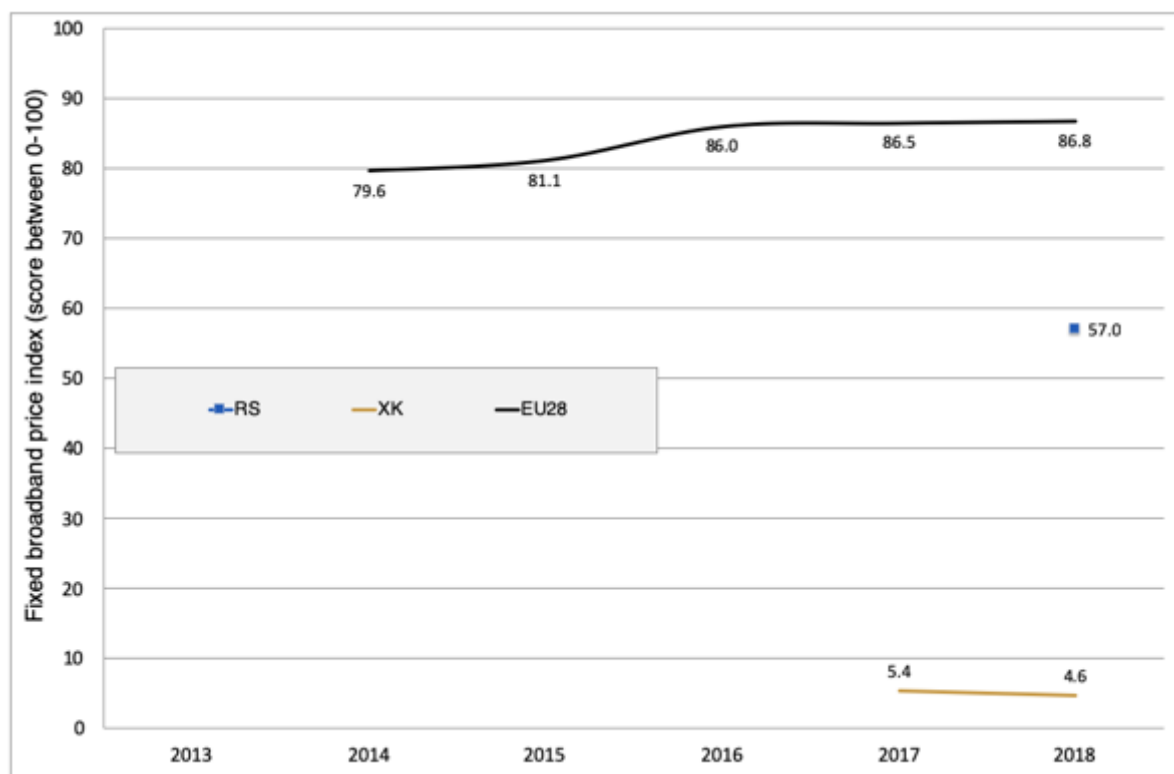
Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

As noted for the previous indicator ultrafast broadband was a new addition to the connectivity dimension in this study.

Five Western Balkans economies were able to provide information, all were well below the EU28 average. The highest level of take up is recorded in Montenegro (5 per cent) followed by Serbia (2 per cent), Albania and North Macedonia (1 per cent) and Turkey (0.01 per cent)

## 1. The connectivity dimension

### 1E.1 Broadband price index



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

The final connectivity indicator examined the price for fixed broadband access<sup>32</sup>. In the 2018 study average costs in euros were provided. In line with DESI in this study information was provided using a 0 to 100 scale. Some economies were able to provide average price data but not indexed data.

Indexed data could only be provided by Kosovo (4.6) and Serbia (57), both significantly below the EU average of 86.8.

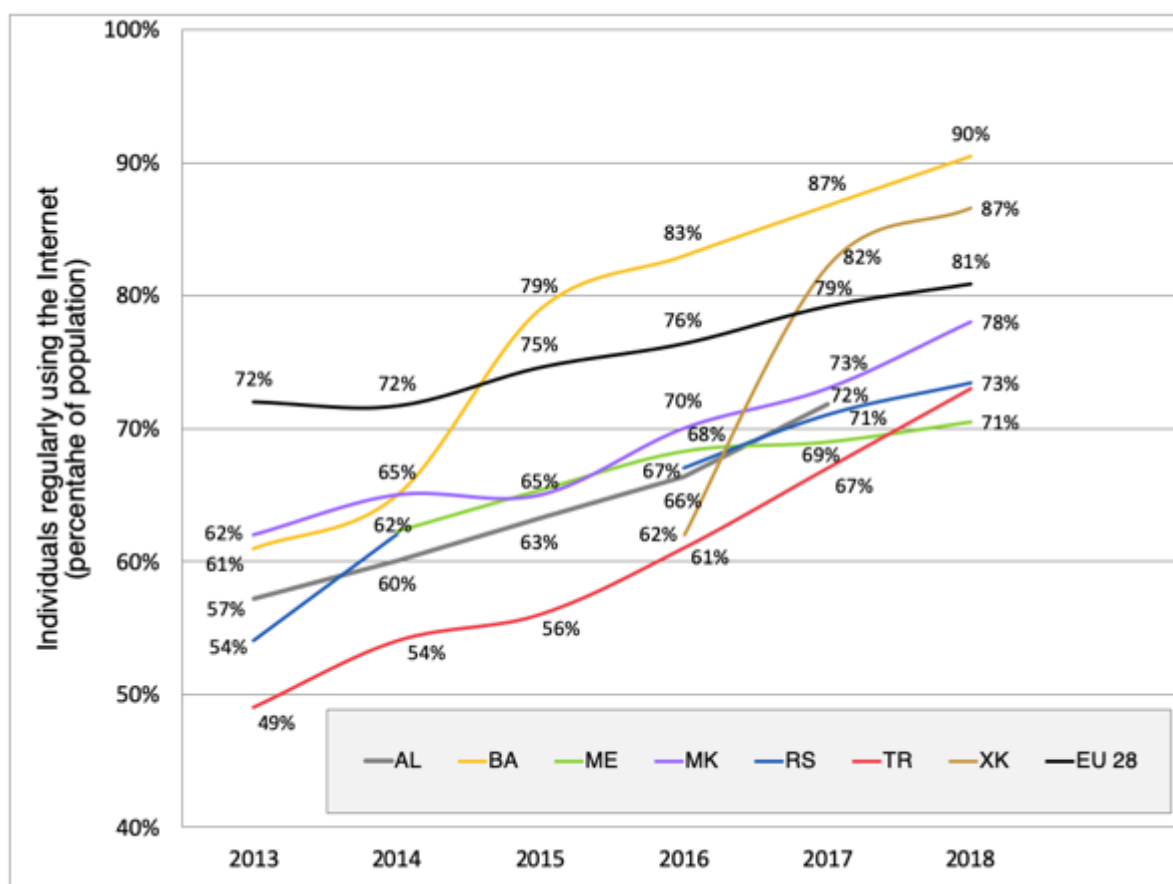
A method to better enable comparison will be developed for the next study.

<sup>32</sup> This indicator is one of four in this study where a lower score indicates better performance (the others are 2A.1B, 6A.2 and 6B.2). Shading to indicate performance elsewhere in this study reflects this transposition.



## 2. The digital skills dimension

### 2A.1 Internet users



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

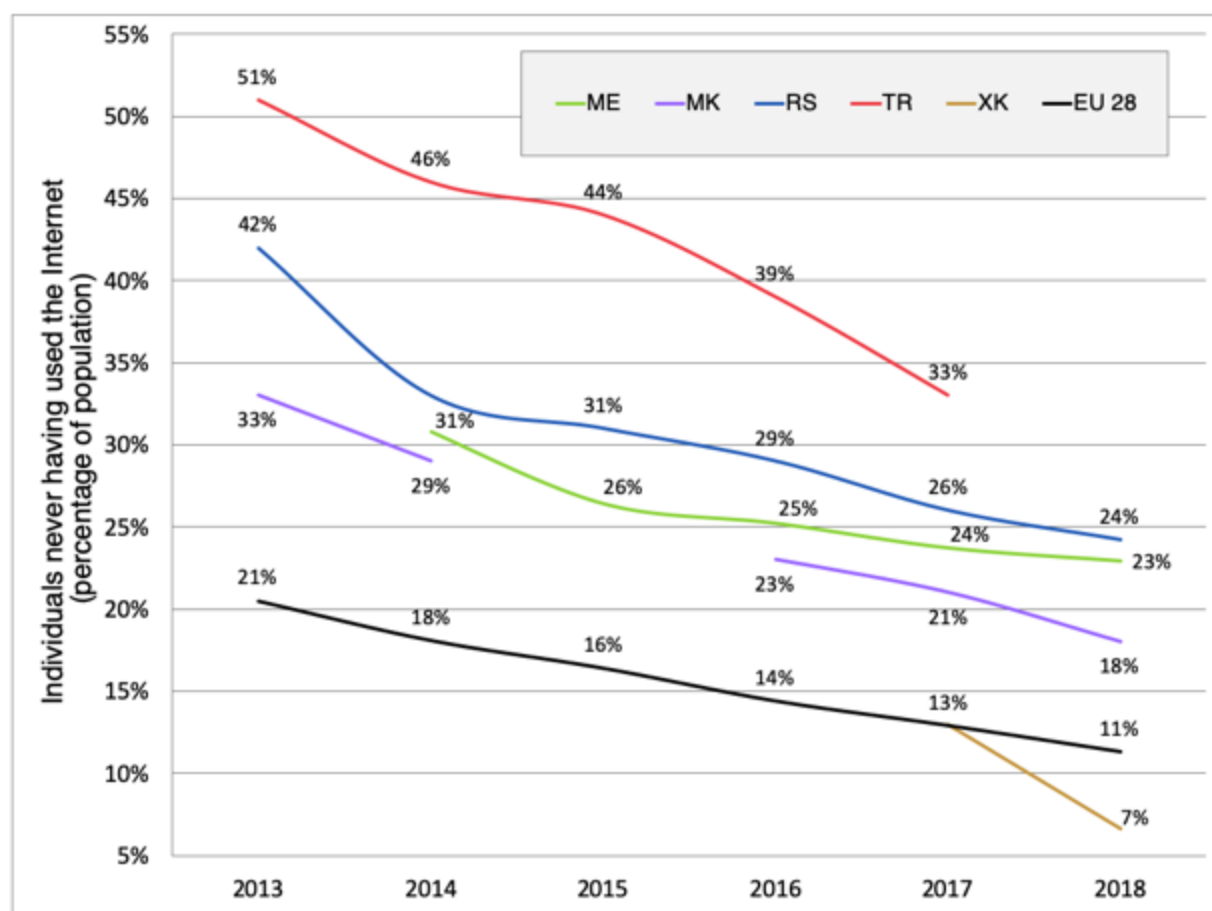
The proportion of Internet users<sup>33</sup> was reported by all of the Western Balkans economies and Turkey. Between 2013 and 2018 the graph highlights steady growth in Internet users, generally at a faster rate than the EU28 average, which only grew by nine per cent. As a result Western Balkans economies are all relatively close to the EU benchmark. With Bosnia and Herzegovina (90 per cent) and Kosovo (87 per cent) exceeding the EU28 average in 2018.

The remaining economies have each recorded an increase in the number of individuals regularly using the Internet from 2013 to 2018 – Montenegro (62 to 71 per cent; 2014- 2018, Turkey (49 to 73 per cent), Serbia (54 to 73 per cent), North Macedonia (62 per cent to 78 per cent) and Albania (57 per cent to 72 per cent) from 2013- 2017.

<sup>33</sup> Individuals who are regular Internet users (at least once a week). Regular internet users – all individuals - % of individuals.

## 2. The digital skills dimension

### 2A.1B Individuals never having used the Internet



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about individuals never having used the Internet was recorded by four of the Western Balkans economies (Kosovo, North Macedonia, Montenegro and Serbia) and Turkey<sup>34</sup>. Most of these economies have demonstrated higher percentages in this indicator than the EU Member State average between 2013 and 2018 with the exception of Kosovo.

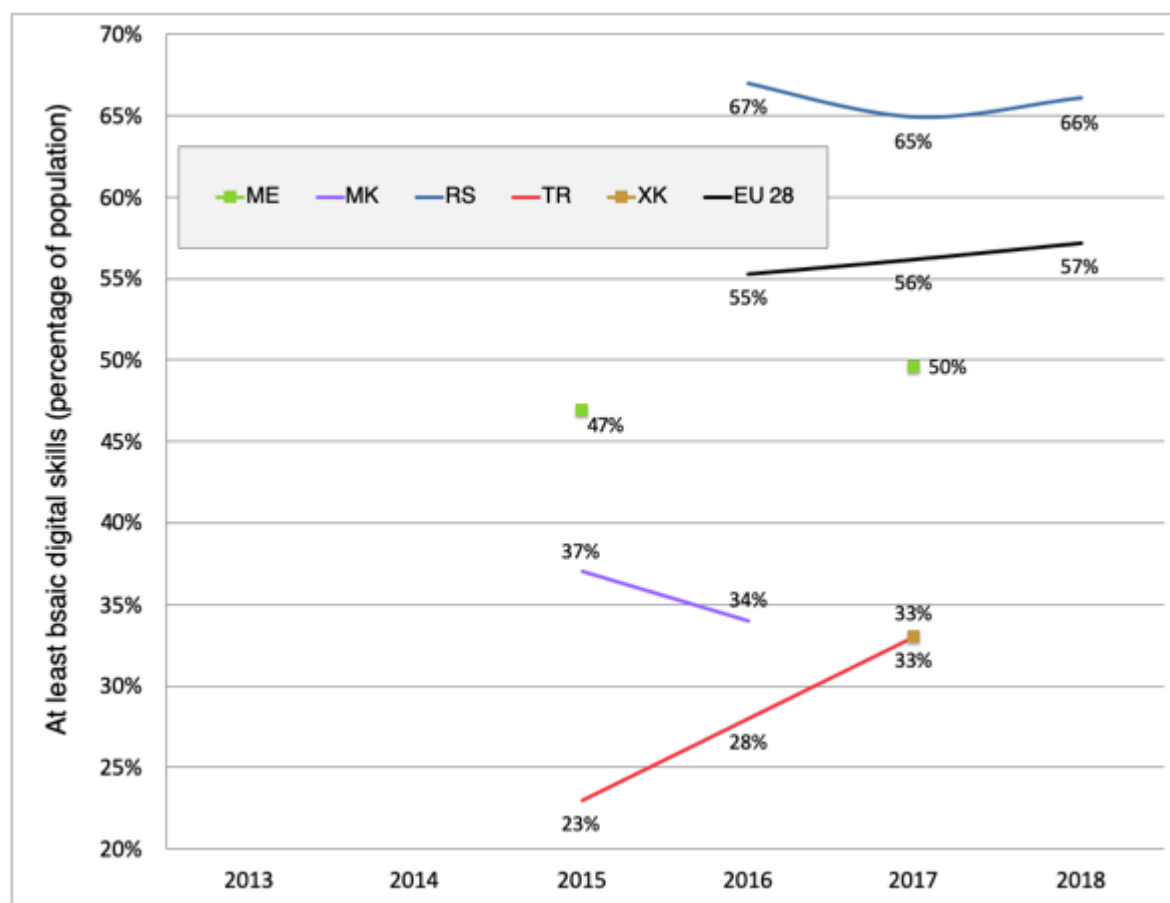
Benchmarking shows that Kosovo is the only economy to establish a score lower than the EU28 average (11 per cent) with 7 per cent of individuals never having used the Internet in 2018.

The remaining economies have recorded a decrease in the number of individuals never having used the Internet between 2013 to 2018, with the exception of Turkey that only provided data until 2017.

<sup>34</sup> This indicator is one of four in this study where a lower score indicates better performance (the others are 1E.1, 6A.2 and 6B.2). Shading to indicate performance elsewhere in this study reflects this transposition.

## 2. The digital skills dimension

### 2A.2 Individuals with at least basic digital skills



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about Individuals with at least basic digital skills<sup>35</sup> in 2018 was only provided by Serbia. Montenegro, Turkey and Kosovo were able to provide data for 2017.

The figure shows that for 2017 and 2018, none of the examined economies are close the 2018 EU28 benchmark of 57 per cent of individuals with at least basic digital skills, with the exception of Serbia (66 per cent) which recorded nine per cent higher.

<sup>35</sup> Persons that have been using the Internet during 3 months are attributed a score on four digital competence domains; information, communication, content-creation and problem-solving, depending the activities they have been able to do. The scores in each domain are basic, above basic and below basic. Individuals not using Internet are classified without digital skills. To be classified "basic or above basic" on the overall indicator an individual has to have basic or above basic skills in all the four Digital Competence domains included in the index: information, communication, content-creation and problem-solving.

## 2. The digital skills dimension

### 2B.1 Share of ICT specialists in the workforce



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about the proportion of ICT specialists in the workforce<sup>36</sup> was provided by only three of the Western Balkans economies – North Macedonia, Serbia and Kosovo. Only North Macedonia (12 per cent) performed higher than the EU28 benchmark in 2018.

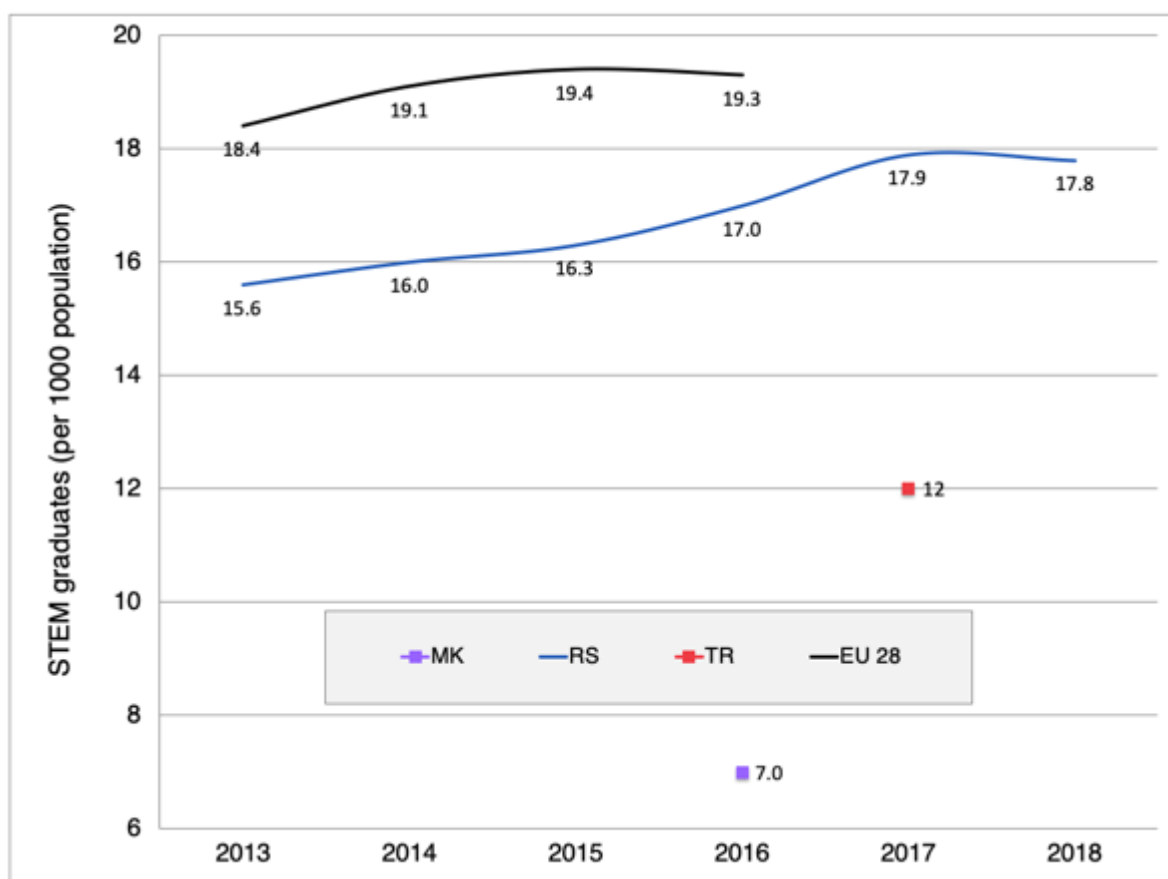
Serbia reported a significant decline to two per cent. It is suggested that information provided in earlier might have been recorded in a different way.

The figure shows that Serbia (2 per cent) and Kosovo (1 per cent) report a score lower than EU28 benchmark (4 per cent) of enterprises employing ICT specialists in 2018

<sup>36</sup> Enterprises employing ICT specialists. ICT specialists are employees for whom ICT is the main job. For example, to develop, operate or maintain ICT systems or applications.

## 2. The digital skills dimension

### 2B.2 Graduates in STEM



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

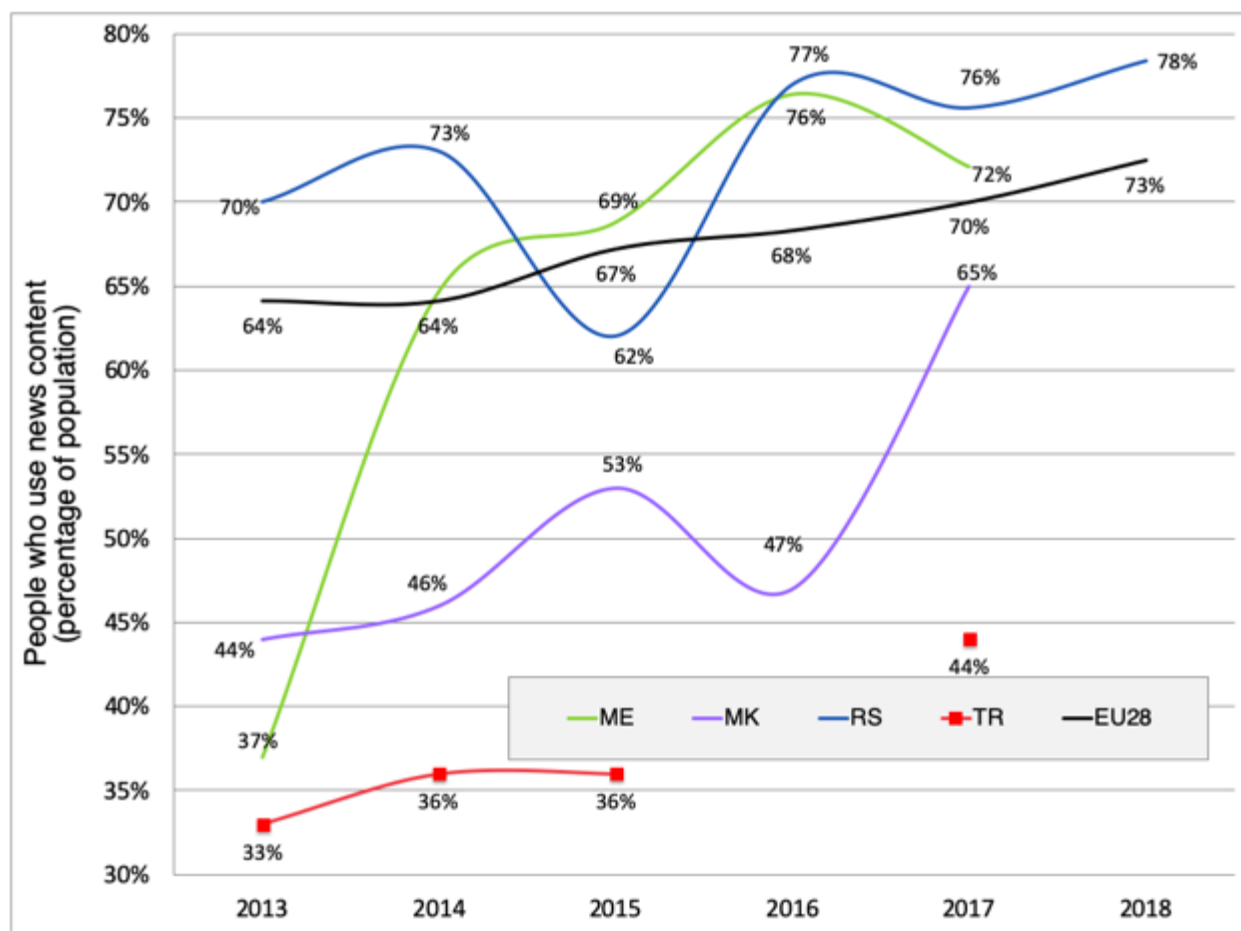
Information concerning graduates in STEM<sup>37</sup> was only provided by Serbia in 2018 (17.8 per cent), just below the EU28 average of 19.3 recorded in 2016.

Turkey provided information for 2017 (12 per cent) and North Macedonia for 2016 (seven per cent). Both are well below the EU benchmark.

<sup>37</sup> Tertiary graduates in science, technology engineering and mathematics per 1,000 inhabitants aged 20-29 years includes new tertiary graduates in a calendar year from both public and private institutions completing graduate and post graduate studies compared to an age group that corresponds to the typical graduation age in most countries.

### 3. The citizen Internet use dimension

#### 3A.1 News



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

For the 'news' indicator<sup>38</sup>, data was collected for three Western Balkans economies (Montenegro, North Macedonia, Serbia) and Turkey. Like the 2018 study information provided shows relatively high levels of fluctuations in comparison with other indicators.

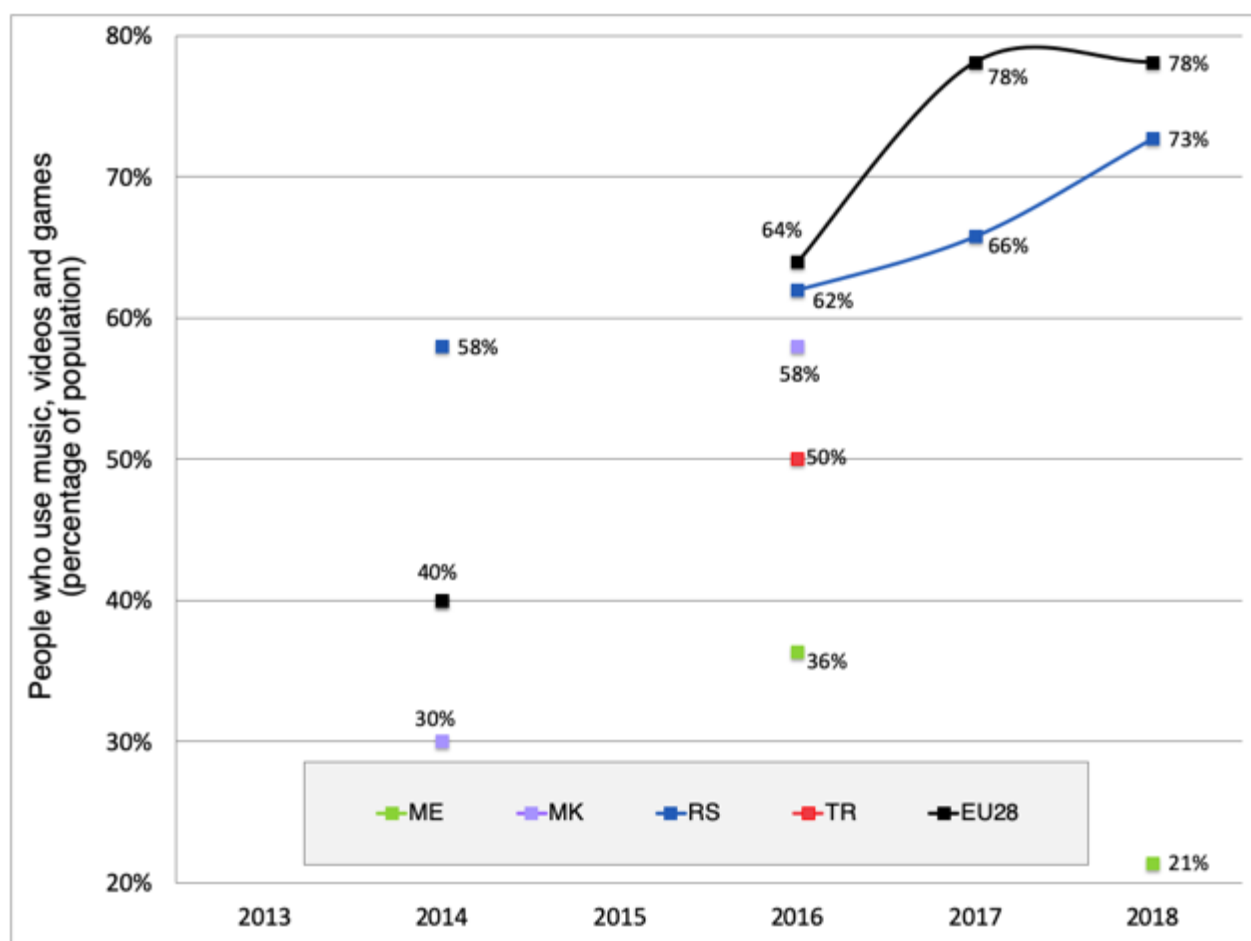
Serbia (78 per cent), the only economy to provide information for 2018 performed higher than the EU28 (73 per cent) in 2018 with five per cent more individuals who used news content. Montenegro performed second highest with (72 per cent), however data is only available till 2017 when it was also above the EU28 average.

North Macedonia (65 per cent) and Turkey (44 per cent) were lower than the EU28 benchmark, data for the two economies is only available until 2017.

<sup>38</sup> Individuals have used Internet, in the last 3 months, for reading / downloading online newspapers / news magazines

### 3. The citizen Internet use dimension

#### 3A.2 Music, Video and Games



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Music, video and games<sup>39</sup> information was only provided by two economies in 2018 – Serbia (73 per cent) and Montenegro 21 per cent).

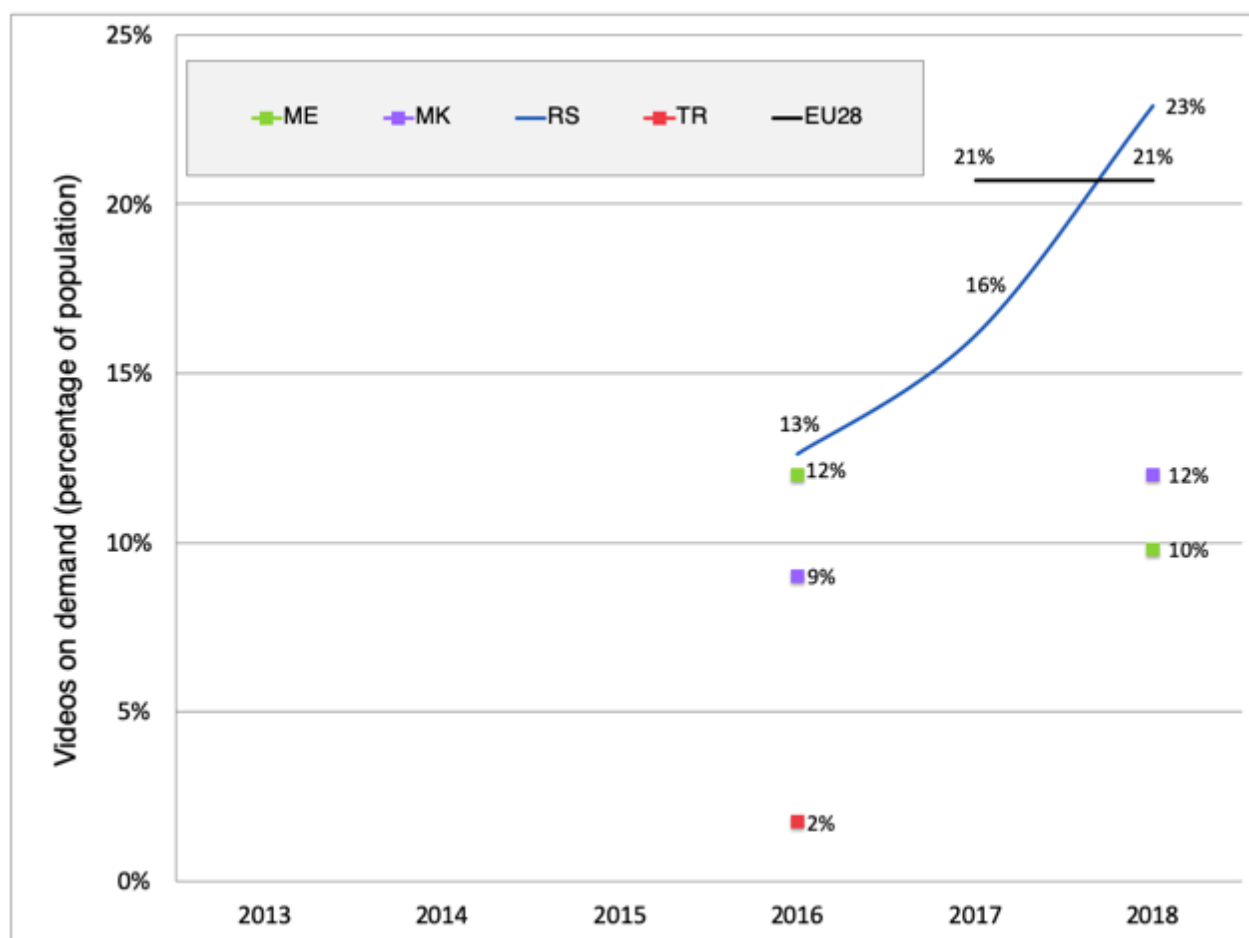
Data for all other countries was collected by and presented in the 2018 study. With the exceptions of Serbia, all other economies are well below the EU28 benchmark.

<sup>39</sup> Individuals have used Internet, in the last 3 months, for playing or downloading games, images films or music



### 3. The citizen Internet use dimension

#### 3A.3 Video On-Demand



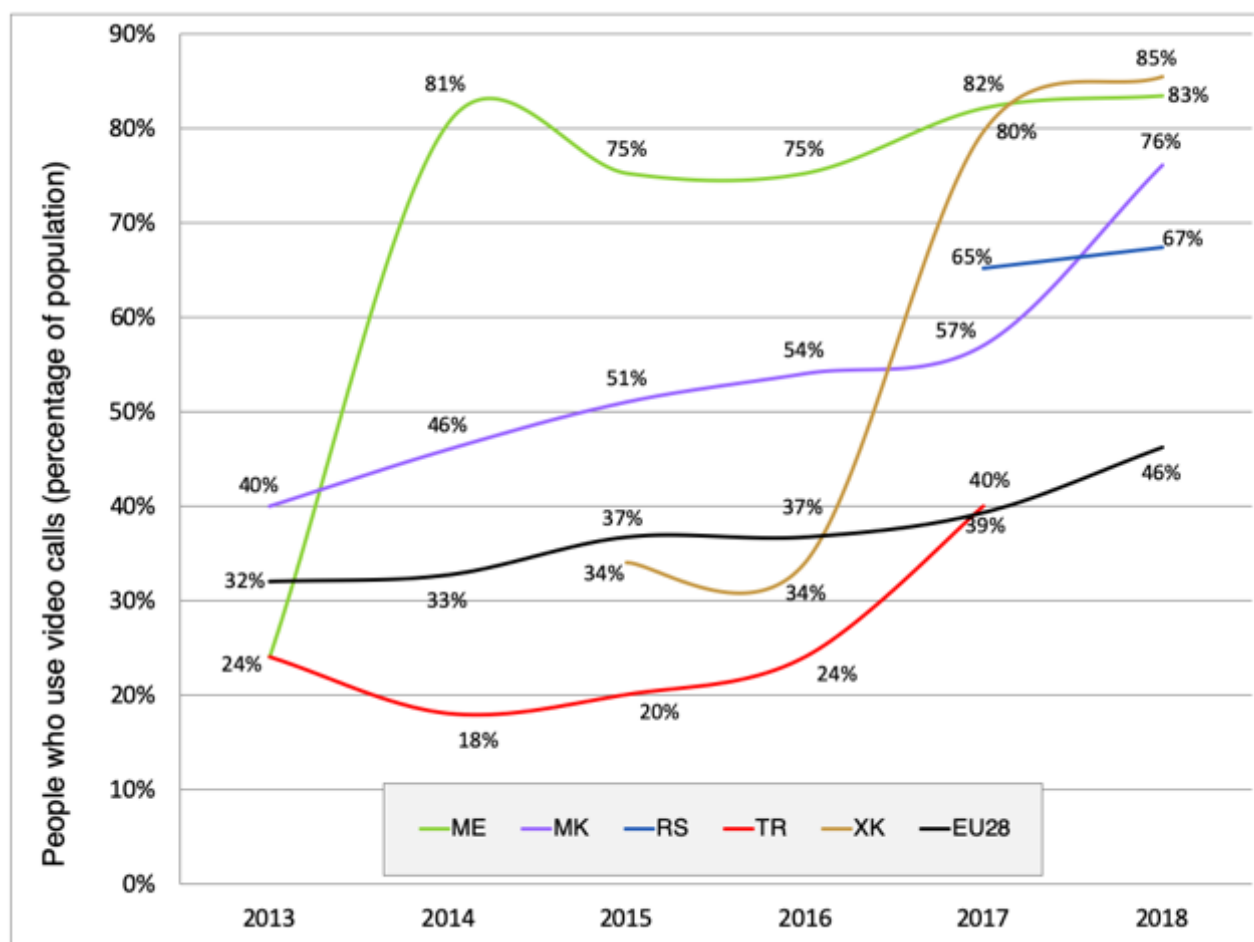
Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

For this indicator, video on-demand<sup>40</sup>, information was only collected in 2018 by three Western Balkans economies – Montenegro (ten per cent), North Macedonia (12 per cent) and Serbia (23 per cent). Information provided by Turkey for 2016 was presented in the last report. Serbia was the best performing Western Balkans economy with the proportion of individuals using video on-demand services two per cent higher than the EU28 benchmark in 2018.

<sup>40</sup> Individuals watching video on demand from commercial services

### 3. The citizen Internet use dimension

#### 3B.1 Video Calls



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

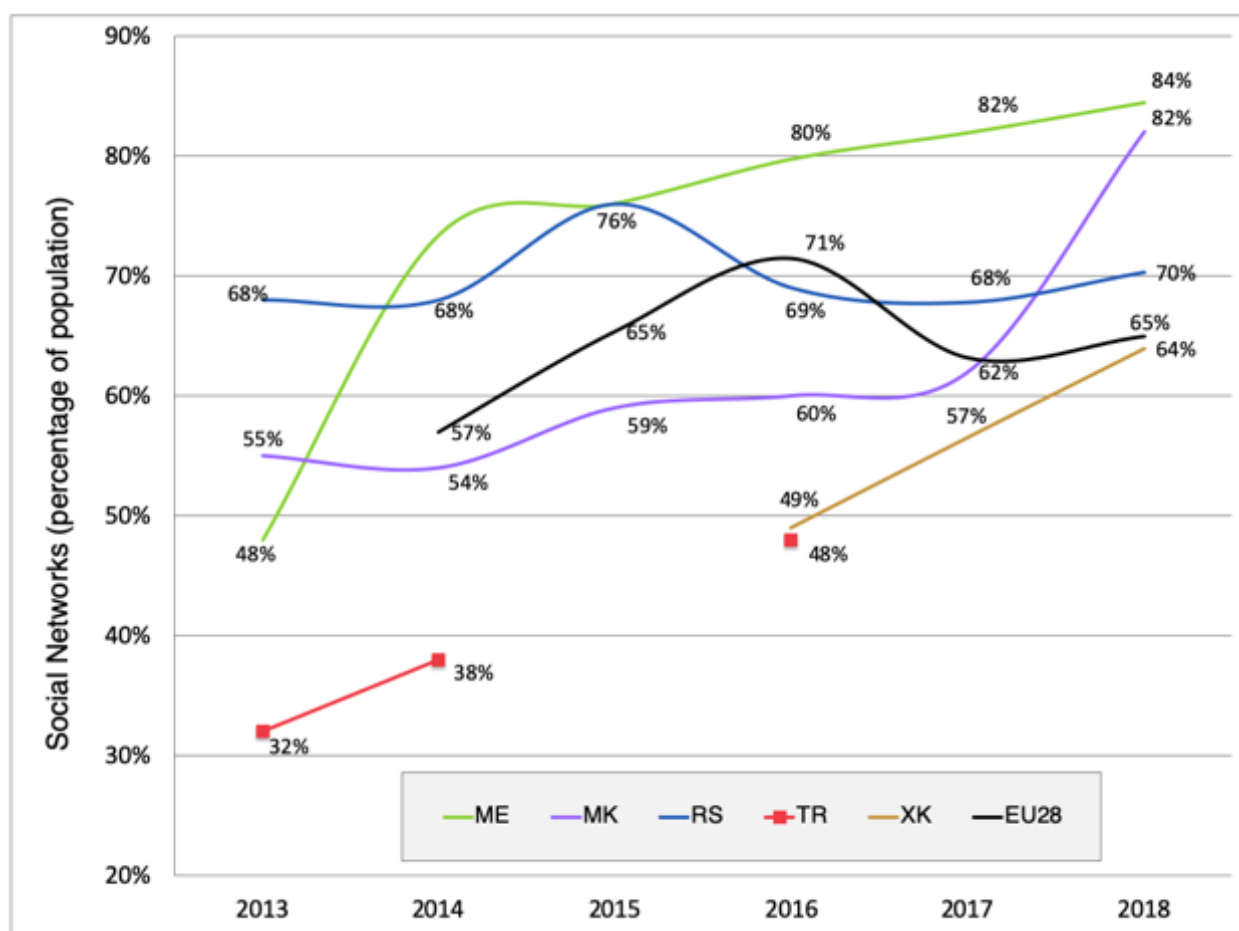
Video calls<sup>41</sup> data was provided for 2018 by four Western Balkans economies (Montenegro, North Macedonia, Serbia and Kosovo). The latest data provided by Turkey related to 2017. In the four economies providing data for 2018 the level of video call use was well above the EU28 benchmark of 46 per cent.

Kosovo was the best performing economy with 85 per cent of the population making video calls in 2018, followed by Montenegro (83 per cent), North Macedonia (76 per cent) and Serbia (67 per cent).

<sup>41</sup> Telephoning or video calls (via webcam) over the Internet

### 3. The citizen Internet use dimension

#### 3B.2 Social Networks



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

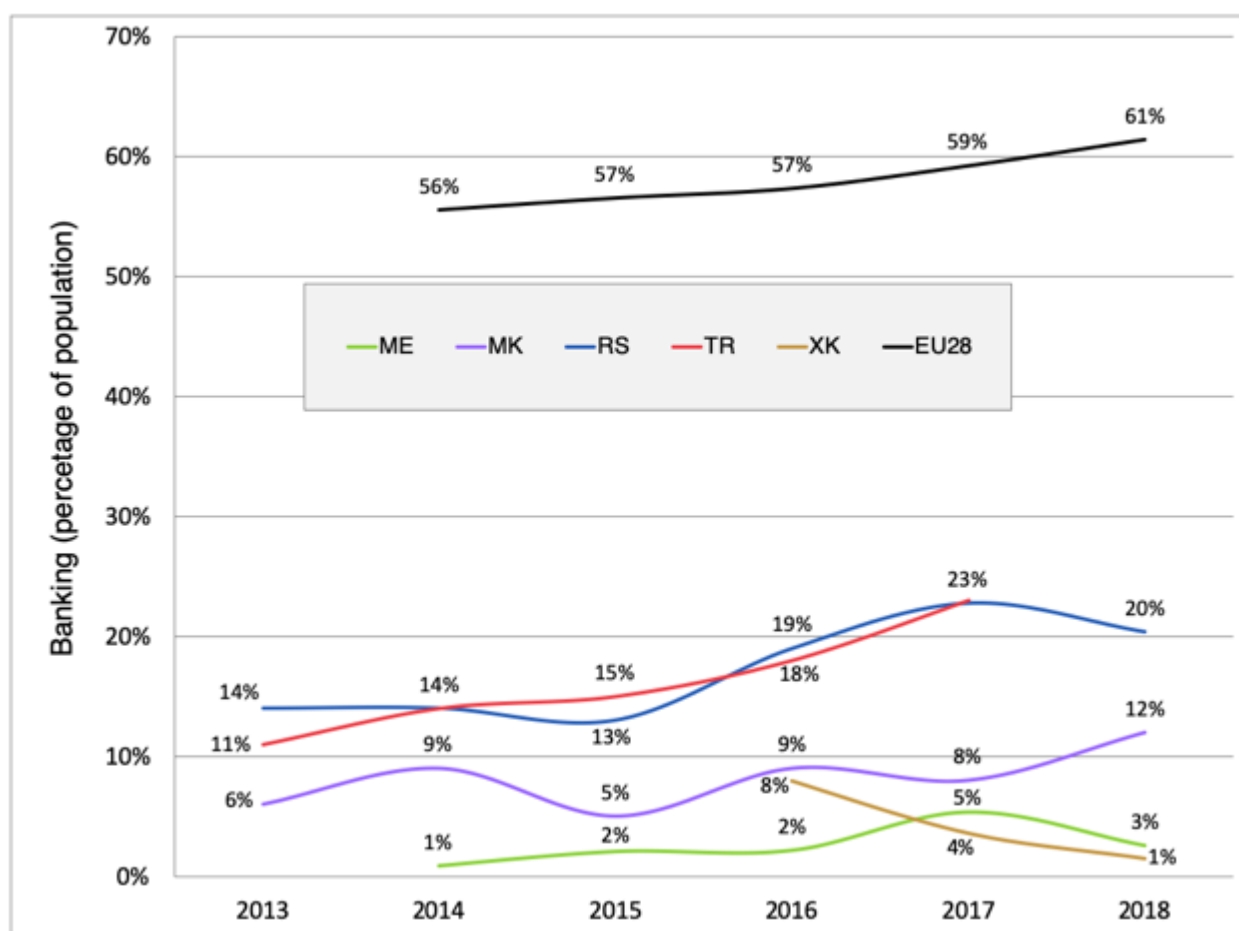
Information about social network use<sup>42</sup> was supplied for 2017 and 2018 by four Western Balkans economies (Montenegro, North Macedonia, Serbia and Kosovo). Like the previous indicator the proportion of the population using social networks is generally above the EU benchmark (65 per cent) in 2018.

Montenegro was the best performing Western Balkans economy with 84 per cent of the population using social networks in 2018, followed closely by North Macedonia (82 per cent). Serbia (70 per cent) was above the EU28 average. Kosovo (64 per cent) was just below the EU28 benchmark.

<sup>42</sup> Individuals have used Internet, in the last 3 months, for participating in social networks (creating user profile, posting messages or other contributions to Facebook, Twitter, etc.)

### 3. The citizen Internet use dimension

#### 3C.1 Banking



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

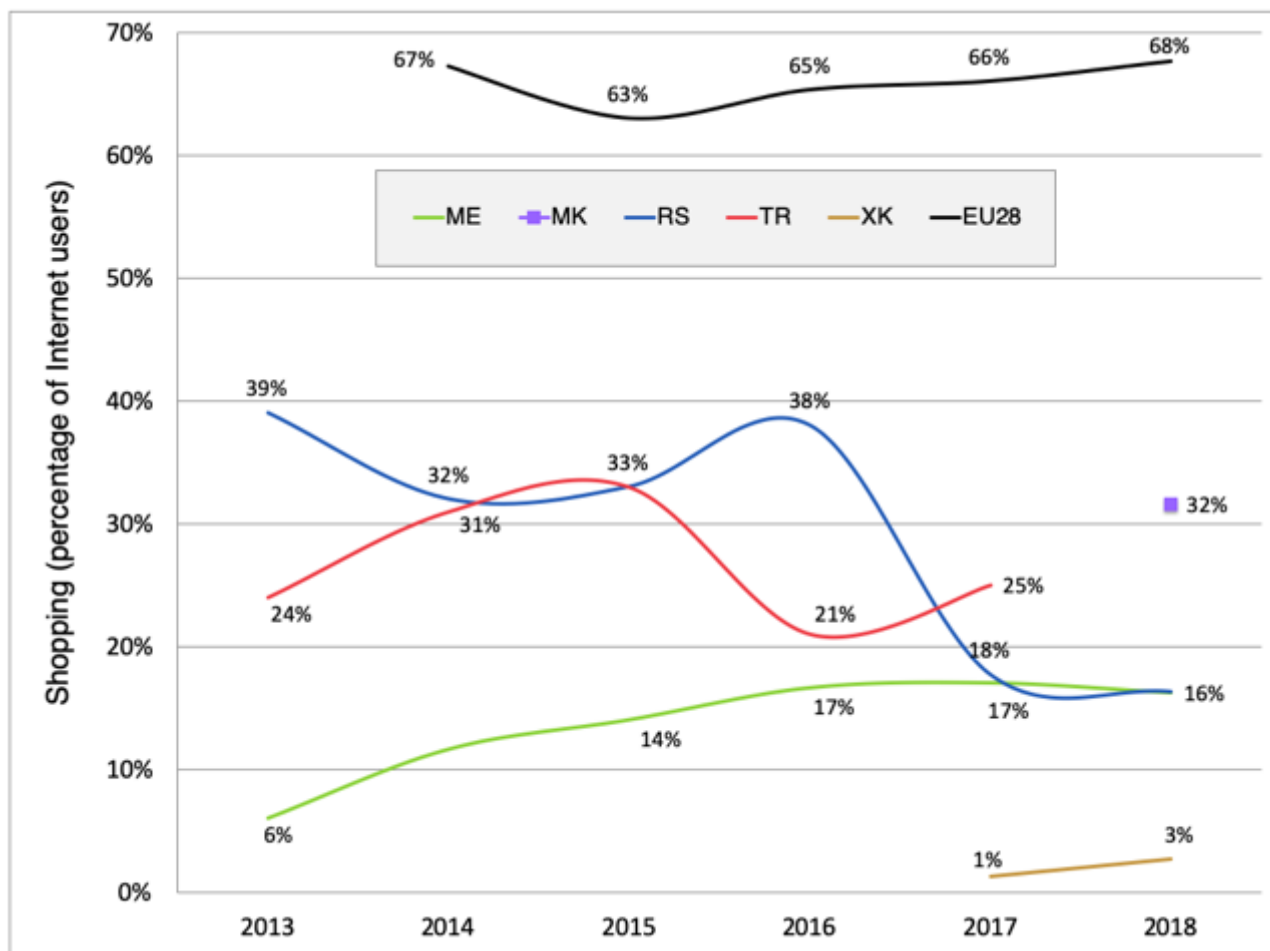
Banking information <sup>43</sup> for 2018 was provided by four Western Balkans economies (Montenegro, North Macedonia, Serbia and Kosovo). Turkey provided data up until 2017. Serbia performs highest of the economies providing data for 2018 with 20 per cent of individuals using the internet for banking in 2018.

The EU28 average (61 per cent) is significantly above the level of the Western Balkans and Turkey economies. North Macedonia (12 per cent) performed the second highest followed by Montenegro (3 per cent) and Kosovo (1 per cent).

<sup>43</sup> Individuals have used Internet, in the last 3 months, for Internet banking.

### 3. The citizen Internet use dimension

#### 3C.2 Shopping



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Data for shopping<sup>44</sup> was reported for 2018 by four Western Balkans economies (Montenegro, North Macedonia, Serbia and Kosovo). Turkey provided data up until 2017. For all of these economies, results demonstrate levels of online shopping well below EU Member States (68 per cent in 2018).

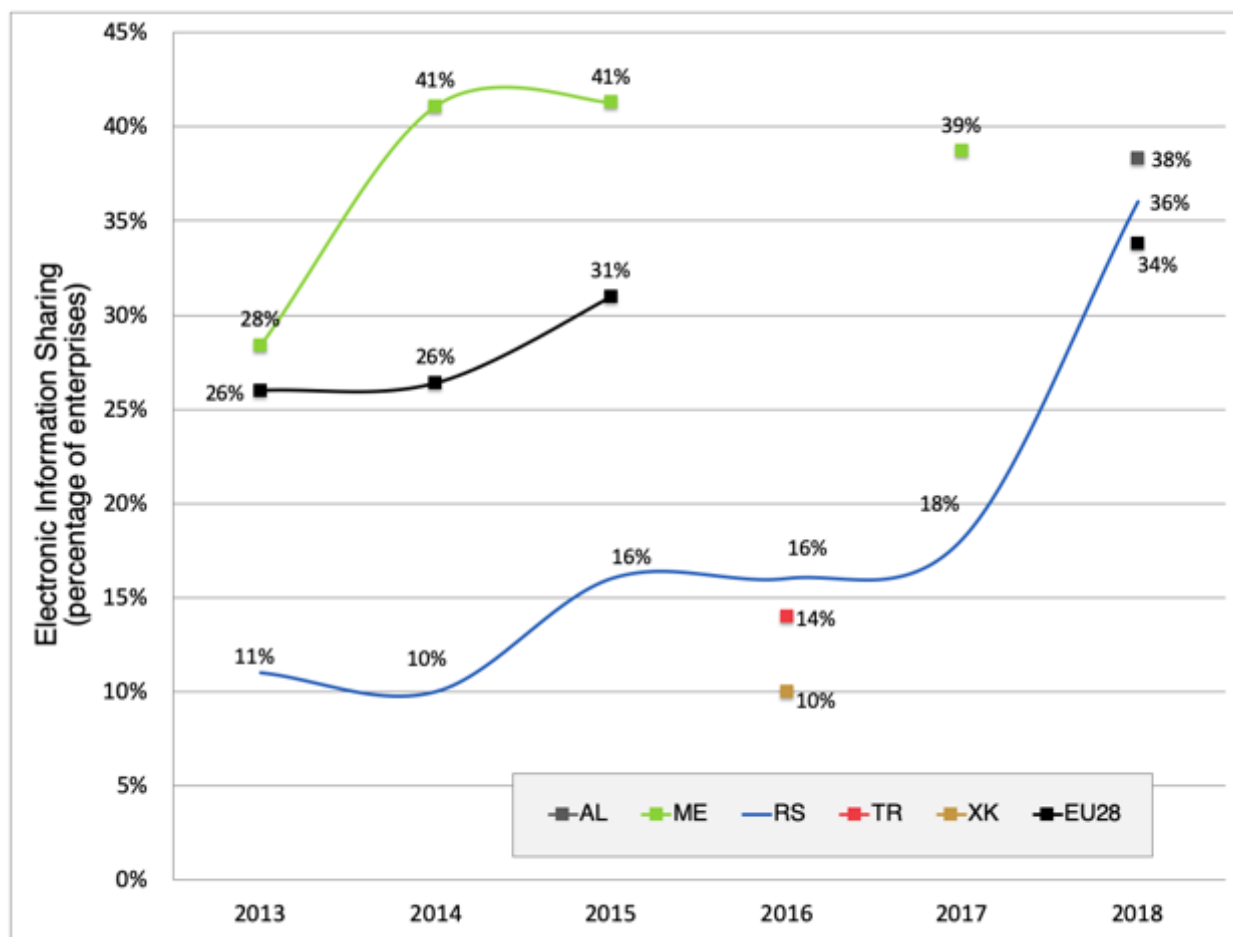
Turkey and Serbia report considerable fluctuations. North Macedonia outperformed the other economies with 32 per cent of individuals using Internet shopping in 2018. Serbia reported declines between 2013 and 2018 but was still in equal second position with Montenegro, in both economies 16 per cent of individuals undertook online shopping.

<sup>44</sup> Individuals using the Internet for ordering goods or services (percentage of individuals).

## 4. The business technology integration dimension

Section 2.5 highlighted that business technology integration is the dimension where Western Balkans economies are performing best in comparison with EU28 Member States. This is reflected by the graphs in this section.

### 4A.1 Enterprises sharing internal information electronically



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Data about enterprises sharing internal information electronically<sup>45</sup> was provided by two Western Balkans economies in 2018 – Albania (38 per cent) and Serbia (36 per cent), both were above the EU28 average. Montenegro (39 per cent) provided data for 2017, this was also above the 2018 EU28 benchmark.

Turkey (14 per cent) and Kosovo (ten per cent) provided data for 2016 which was reported in the last year's report.

<sup>45</sup> Enterprises who have ERP software package to share information between different functional areas

## 4. The business technology integration dimension

### 4A.1B Business connectivity



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

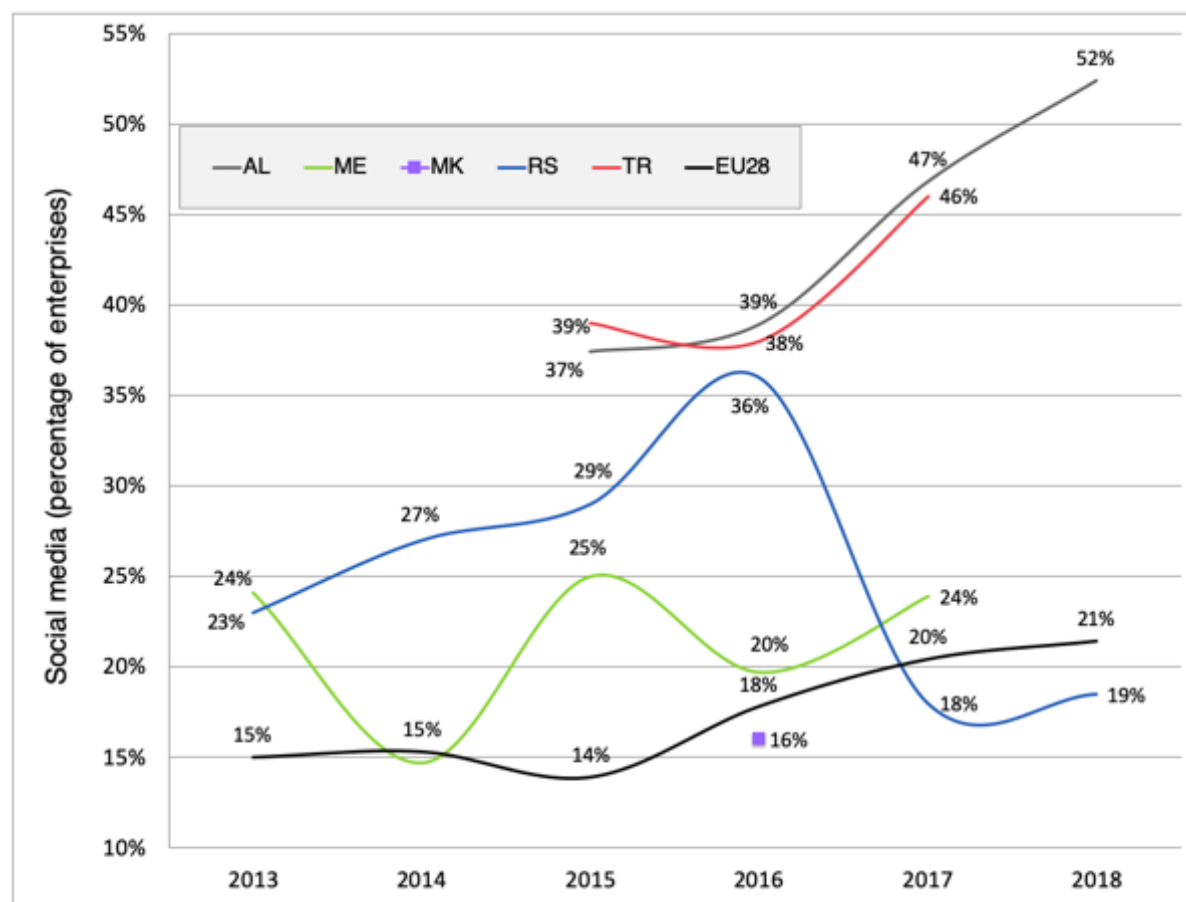
Business connectivity information was provided by five Western Balkans economies – Albania (95 per cent), Montenegro (96 per cent), North Macedonia (82 per cent), Serbia (99 per cent) and Turkey (95 per cent).

The EU28 average is 97 per cent in 2018. Only Serbia is above this level but three of the other economies are within two per cent of this benchmark.



## 4. The business technology integration dimension

### 4A.3 Enterprises using Social Media



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

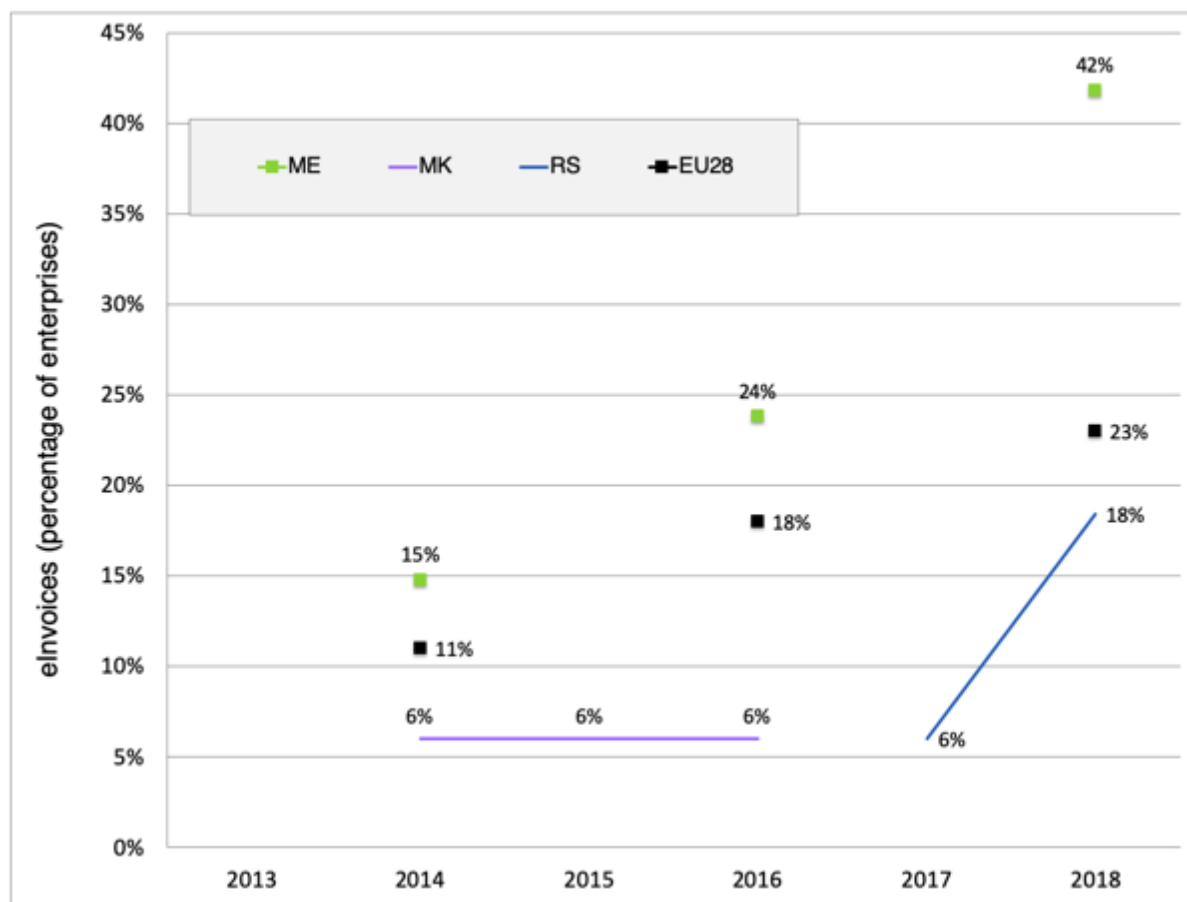
Information about enterprises using social media<sup>46</sup> was provided by two Western Balkans economies for 2018 – Albania (52 per cent) and Serbia (19 per cent). Montenegro (24 per cent) and Turkey (46 per cent) provided information for 2017. With the exception of Serbia all of these were above the EU28 average proportion of businesses (21 per cent) using social media.

Albania has the highest value recorded with 52 per cent of enterprises using social media in 2018. Serbia was consistently above the EU28 average until 2018 where it dropped down to 19 per cent, which is below the EU28 (21 per cent) benchmark for that year.

<sup>46</sup> Enterprises using at least one of the following social media: social networks, enterprise's blog or microblog, multimedia content sharing websites, wiki-based knowledge sharing tools. Using social media means that the enterprise has a user profile, an account or a user license depending on the requirements and the type of the social media.

## 4. The business technology integration dimension

### 4A.4 Enterprises sending and/or receiving e-invoices



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

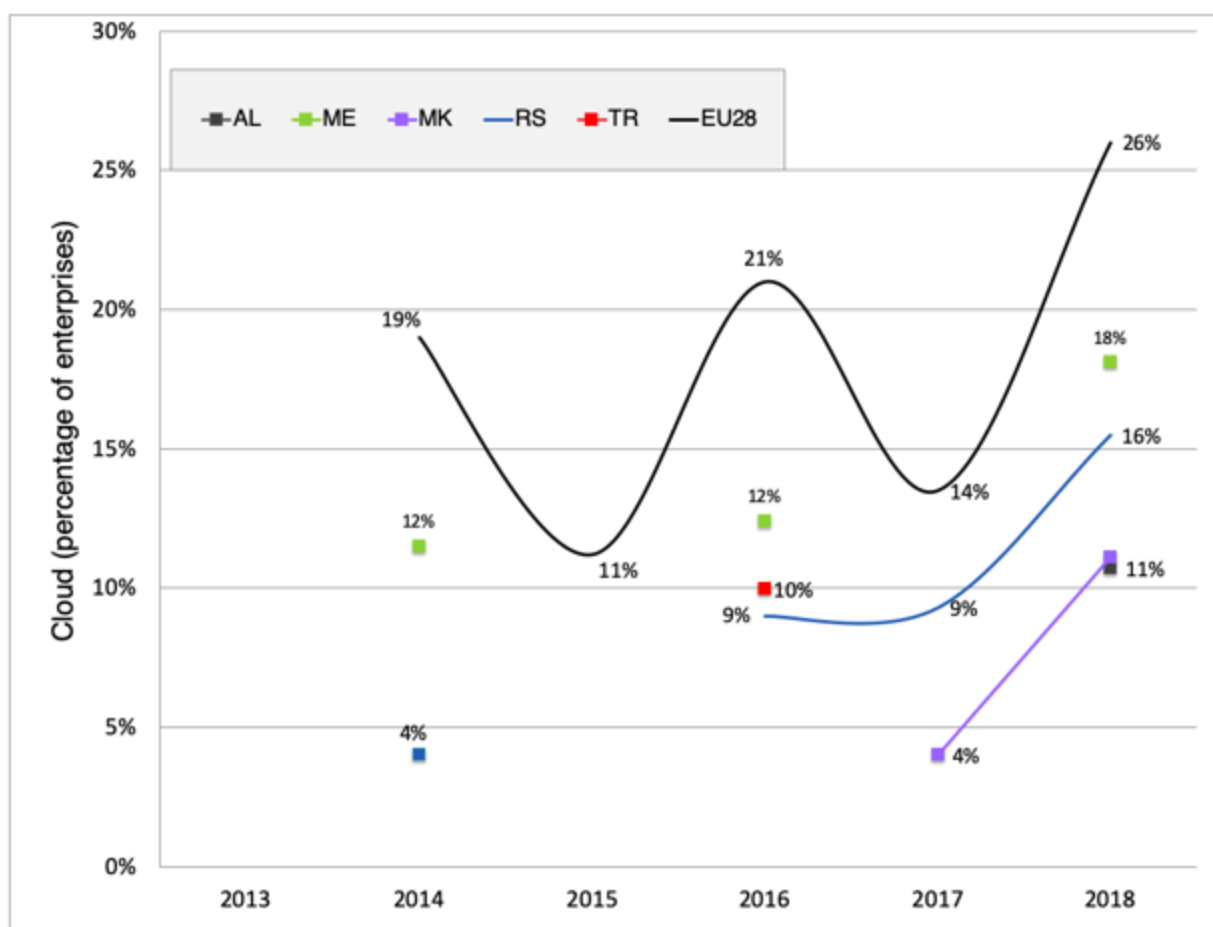
Information about enterprises sending and/or receiving e-invoices<sup>47</sup> was provided by two Western Balkans economies in 2018. Montenegro reported the percentage of enterprises using eInvoices as 42 per cent. This was considerably above the EU28 average of 23 per cent.

2016 information for Macedonia (six per cent) was presented in the 2018 report.

<sup>47</sup> Sending invoices in an agreed format (as EDIFACT, XML, etc.) which allows automatic processing, without the individual message being manually typed.

## 4. The business technology integration dimension

### 4A.5 Enterprises using Cloud



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

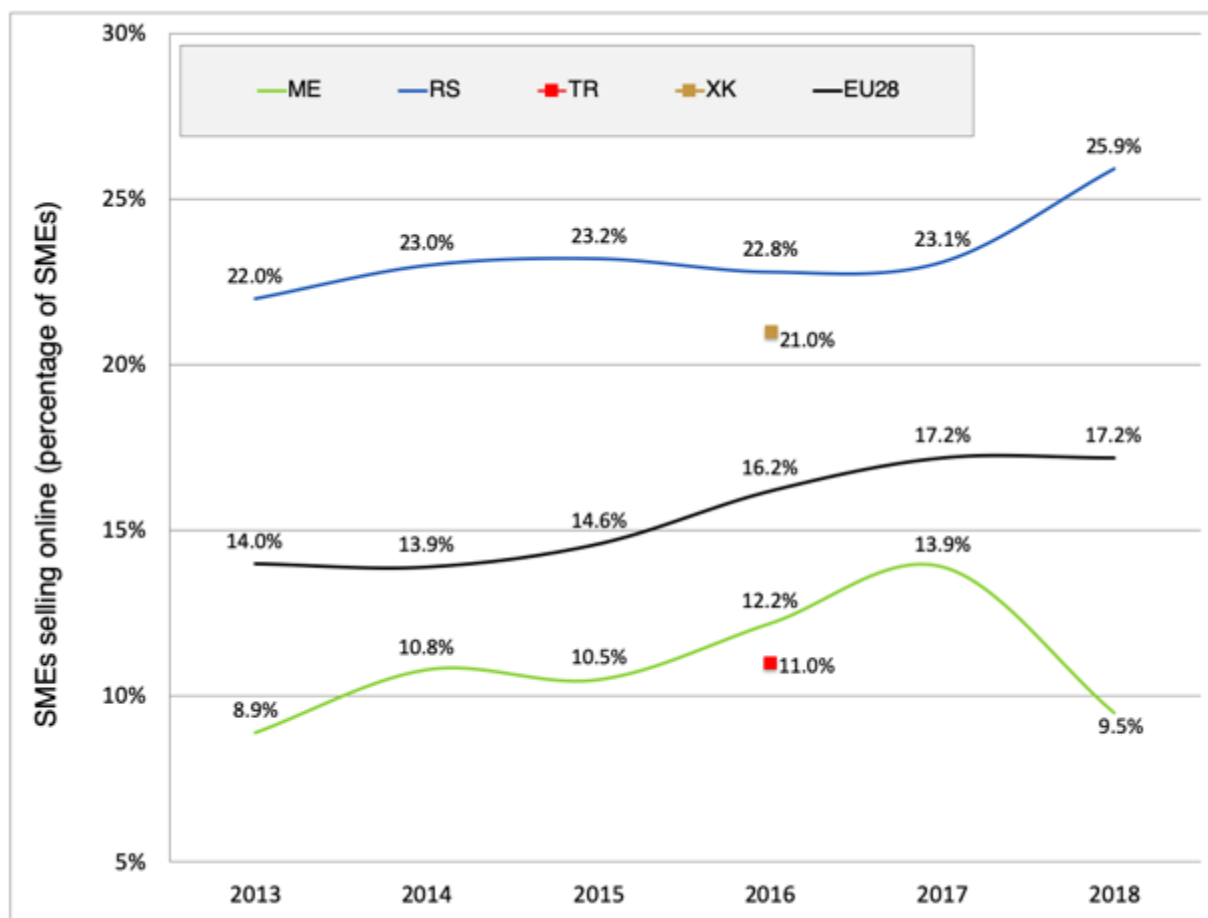
Information about enterprises using cloud<sup>48</sup> in 2018 was supplied by four Western Balkans economies (Albania, Montenegro, North Macedonia and Serbia). All reported cloud use levels well below the 2018 EU28 average level of 26 per cent. But it is notable that the EU figure appears to have cyclical fluctuations.

Montenegro was the leading economy with 18 per cent of enterprises using cloud in 2018. Serbia (16 per cent), North Macedonia (11 per cent), and Albania (11 per cent) were also below the EU28 benchmark.

<sup>48</sup> Cloud computing refers to purchased ICT services that have all of the following characteristics: are delivered from servers of service providers; can be easily scaled up or down; can be used on-demand by the user without human interaction with the service provider; are paid for, either per user, by capacity used, or they are pre-paid.

## 4. The business technology integration dimension

### 4B.1 SMEs selling online



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

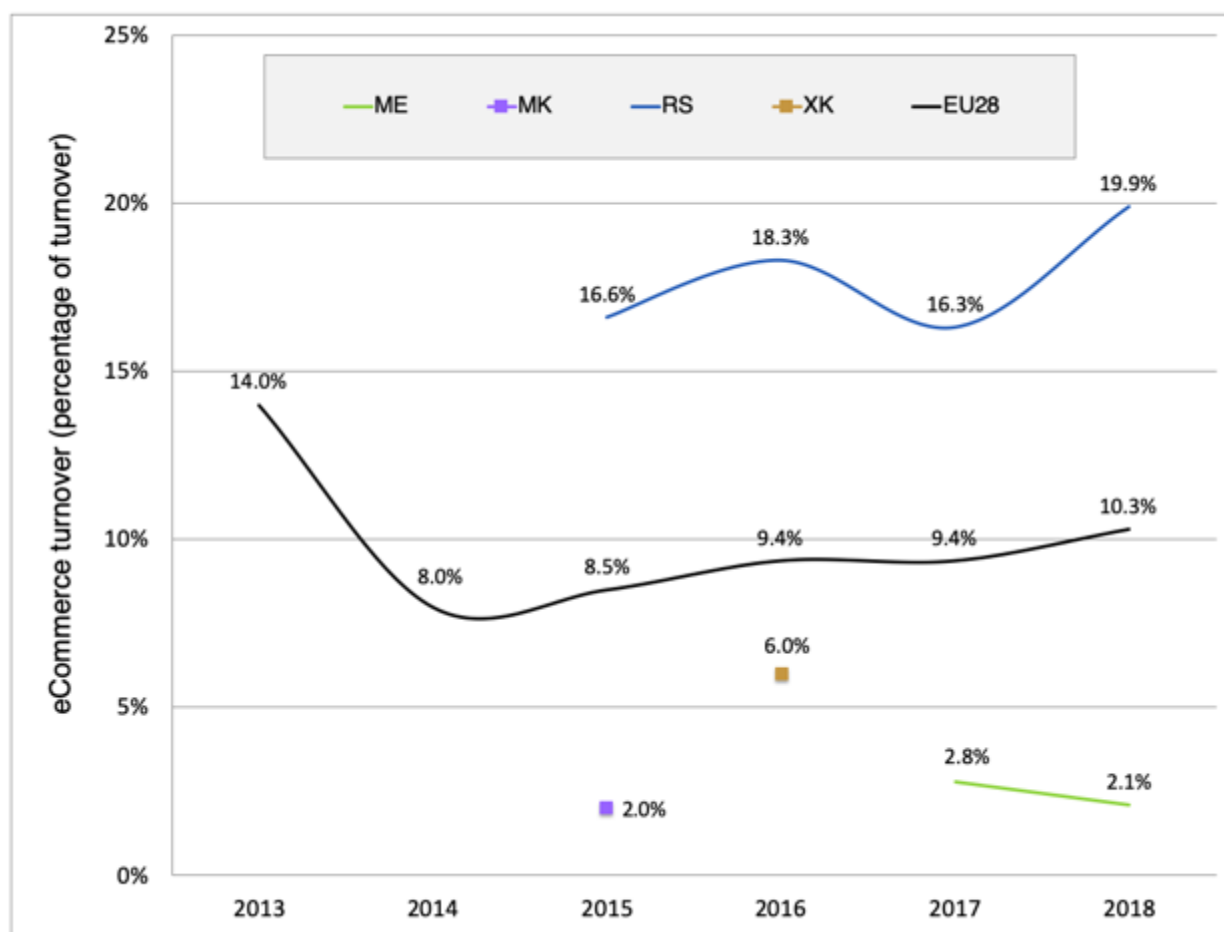
Information about SMEs selling online<sup>49</sup> was provided by two Western Balkans economies for 2018 – Serbia (25.9 per cent) exceeded the EU28 average of 17.2 per cent. Montenegro reported 9.5 per cent of SMEs selling online.

2016 information from Turkey (11 per cent) and Kosovo (21 per cent) was presented in the 2018 report.

<sup>49</sup> The sales realised, during the previous calendar year, via any computer networks should represent at least 1% of the total turnover value (in monetary terms, excluding VAT). Computer networks include websites, EDI-type systems and other means of electronic data transfer, excluding manually typed e-mails.

## 4. The business technology integration dimension

### 4B.2 Turnover from eCommerce



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

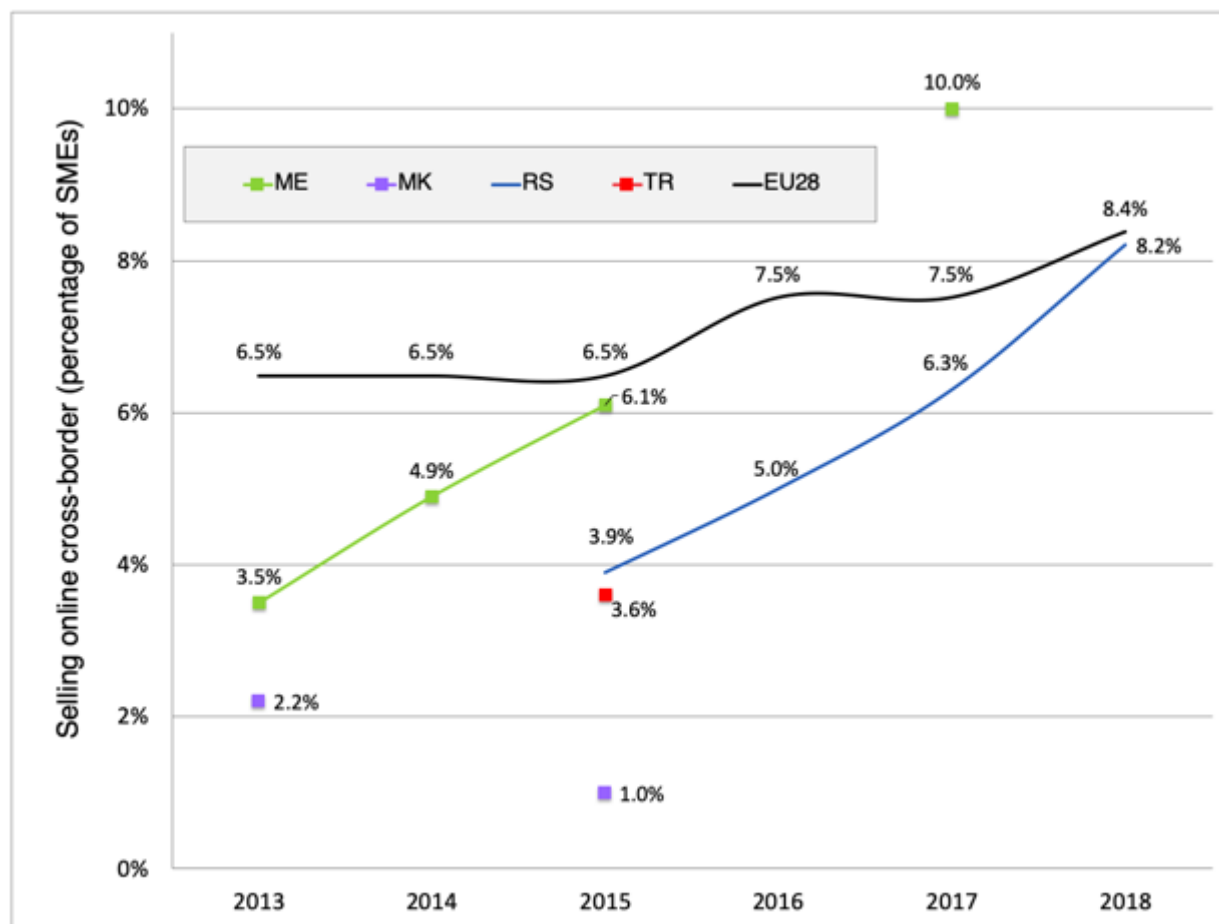
Information about turnover from eCommerce<sup>50</sup> in 2018 was provided by two Western Balkans economies – Serbia (19.9 per cent) exceeded the EU28 average of 10.3 per cent. Montenegro reported 2.1 per cent eCommerce turnover.

Kosovo reported turnover of 6 per cent for 2016, this was presented in last year's report.

<sup>50</sup> The value of sales realised, during the previous calendar year, via any computer networks in % of the total turnover value (in monetary terms, excluding VAT). Computer networks include websites, EDI-type systems and other means of electronic data transfer, excluding manually typed e-mails.

## 4. The business technology integration dimension

### 4B.3 SMEs selling online cross-border



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about SMEs selling online cross border<sup>51</sup> in 2018 was provided by Serbia (8.4 per cent), this was just above the EU28 average of 8.2 per cent. Montenegro reported 10 per cent selling across borders in 2017.

Kosovo reported turnover of 6 per cent for 2016, this was presented in last year's report.

Data for other countries for 215 or earlier was reported in the 2018 study.

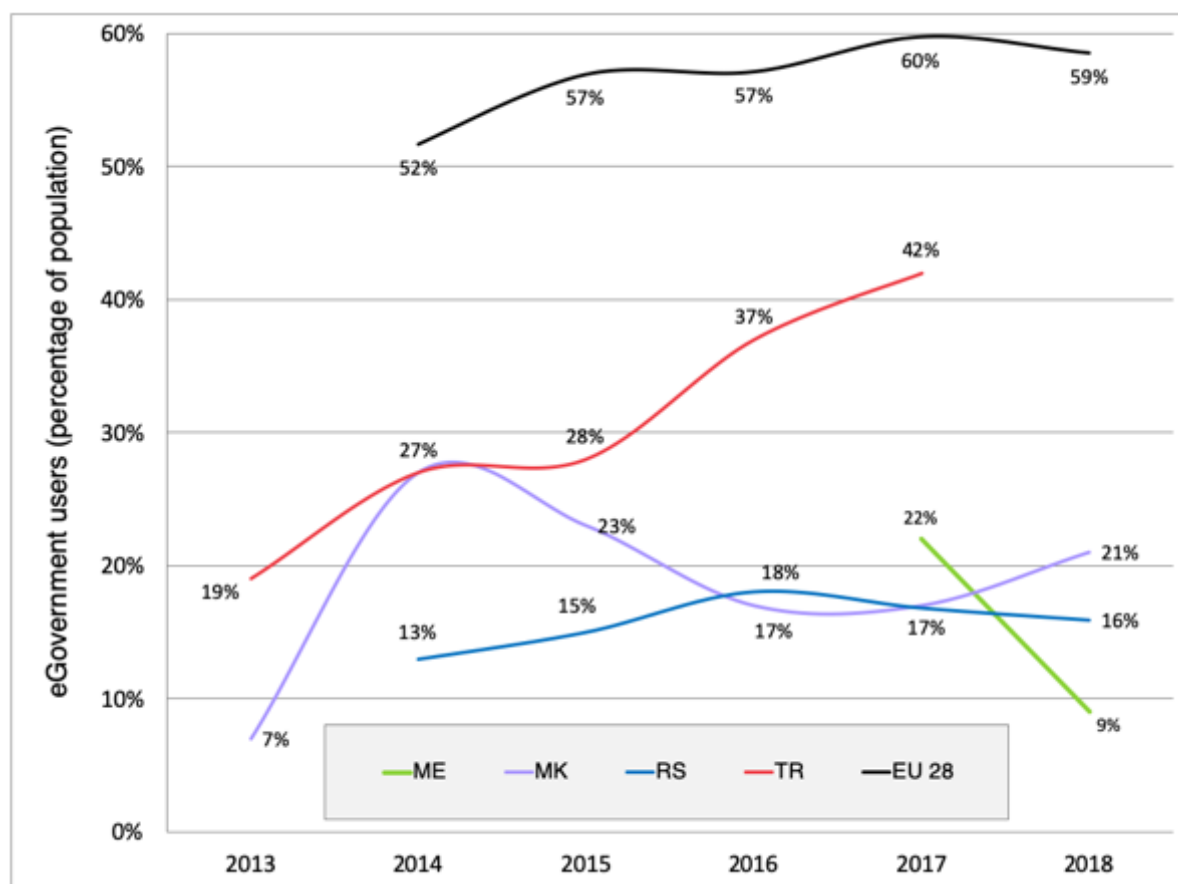
<sup>51</sup> The sales have been realised, during the previous calendar year, via any computer networks (in monetary terms, excluding VAT). Computer networks include websites, EDI-type systems and other means of electronic data transfer, excluding manually typed e-mails.

## 5. The digital public services dimension

This review of the digital public services dimension highlights that three indicators, based on newly presented DESI statistics, have been introduced this year. Data provided by Western Balkans economies for these new indicators is very sparse (with the exception of Serbia).

DESI data collection training for Western Balkans representatives in March 2019 suggested a two year lag from deciding to collect data until the first validated data is available. It might be wise to introduce a similar two year period before introducing new DESI indicators in future studies. Else there is little data for comparison.

### 5A.1 People interacting with public authorities over the Internet



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about people interacting with public authorities over the Internet in the last year<sup>52</sup> was provided by three Western Balkans economies (Montenegro, North Macedonia and Serbia) and Turkey.

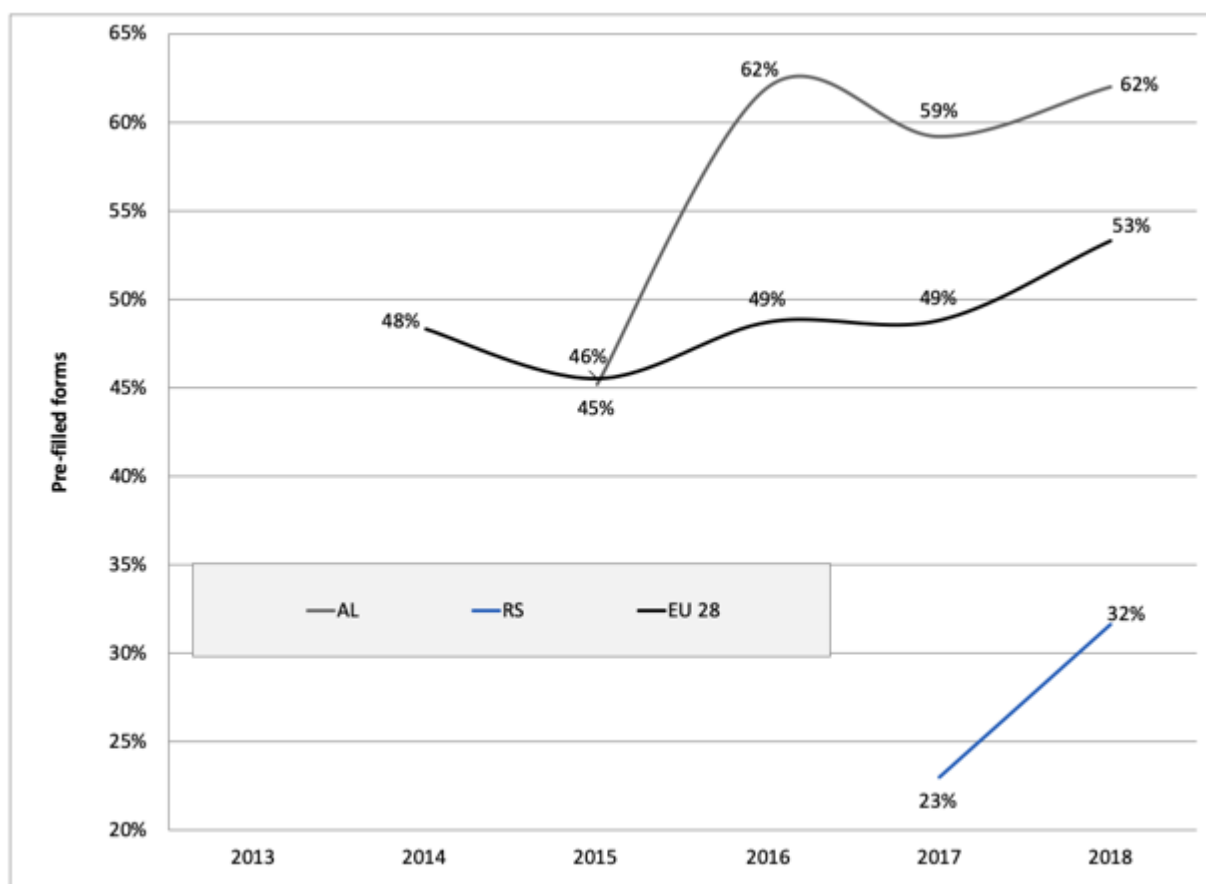
The figure shows that all economies perform lower than the EU28 average. Montenegro was the lowest out of all economies in 2018, followed by Serbia (16 per cent) and Macedonia (21 per cent). Turkey reported 42 per cent of people interacting in 2017.

<sup>52</sup> Individuals have used Internet, in the last 12 months, for interaction with public authorities. It includes obtaining information from public authorities web sites, OR downloading official forms OR sending filled in forms.



## 5. The digital public services dimension

### 5A.2 Data pre-filled in online public services forms



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

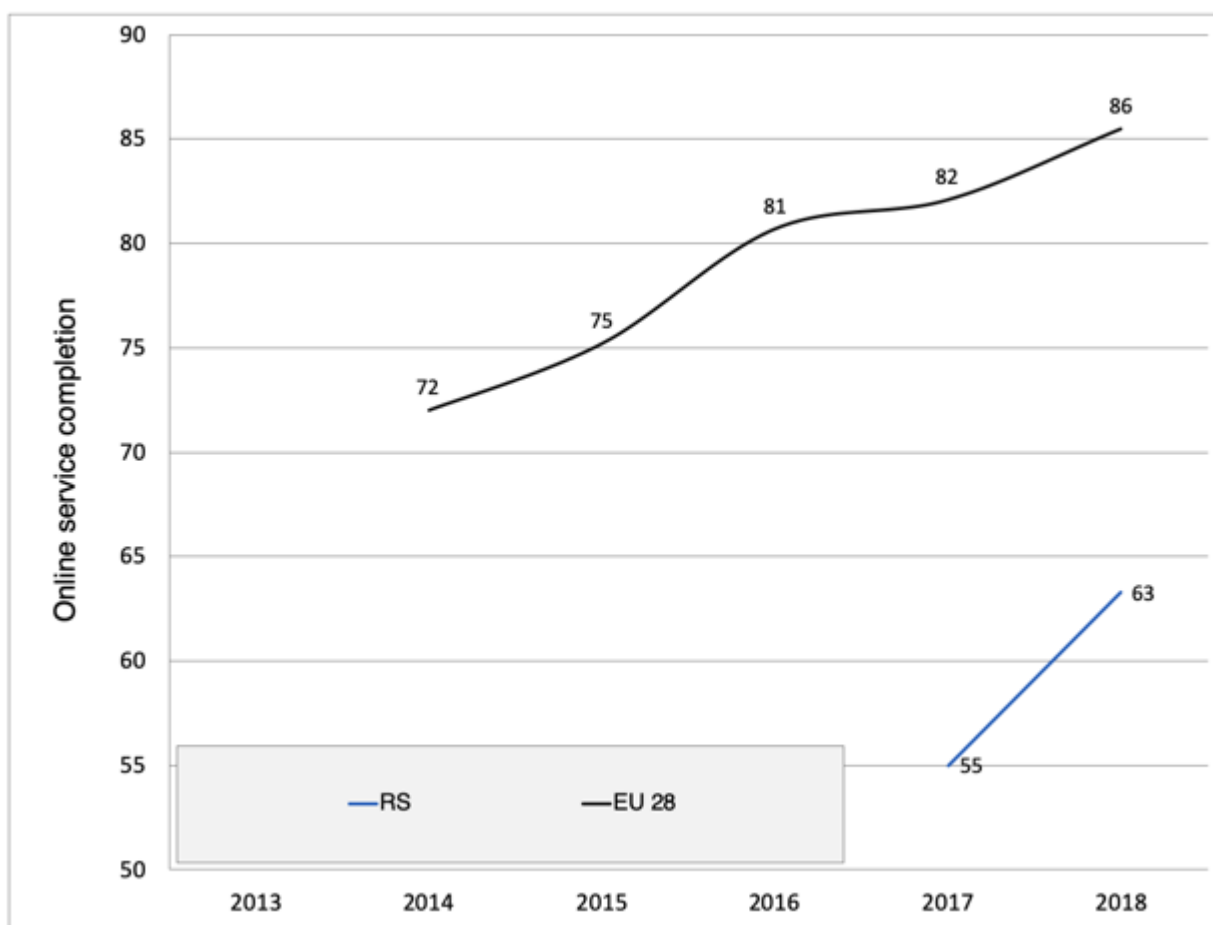
Statistics about pre-filled online public services forms<sup>53</sup> shows a gradual increase in EU28 performance from 2014, reaching 53 per cent in 2018. Data was provided by two Western Balkans economies. Albania reported 62 per cent prefilled online forms in 2018, this was above the EU28 benchmark.

Serbia (32 percent) was below the EU28 benchmark in 2018.

<sup>53</sup> Amount of data that is pre-filled in Public Services' online forms.

## 5. The digital public services dimension

### 5A.3 Steps in a public service interaction completed online



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

This DESI indicator, steps in a public service interaction completed online<sup>54</sup>, shows a steady increase in performance for the EU28 between 2014 and 2018.

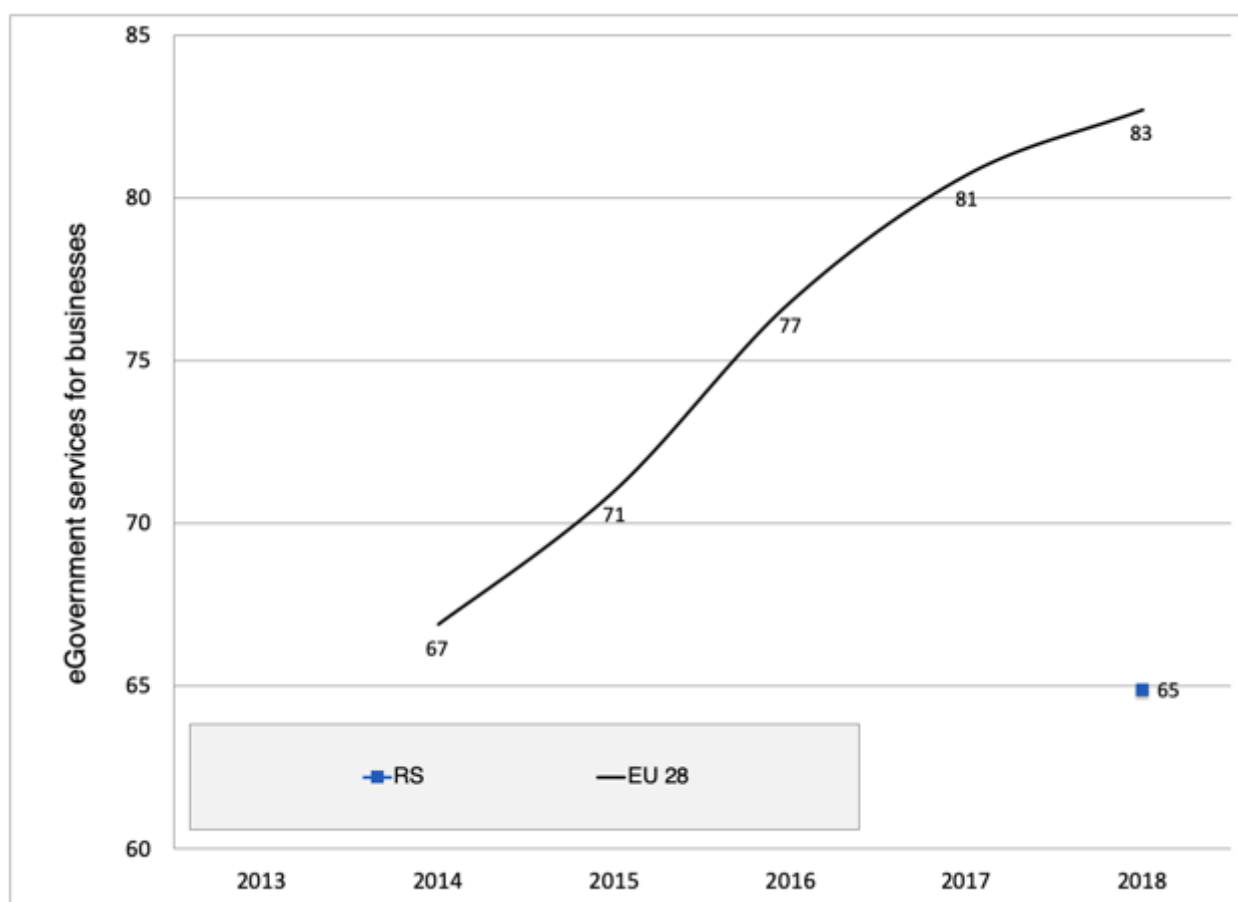
In the last report Western Balkans economies were not able to provide this information. The information is relatively complex to collect and uses different online methods to most of the other indicators which can be obtained from household and business surveys or from regulators and government.

Serbia is the only Western Balkans economy to have provided data. An increase from 55 in 2017 to 63 in 2018 is reported.

<sup>54</sup> Share of the steps in a Public Service life event that can be completed online.

## 5. The digital public services dimension

### 5A.4 eGovernment services for business



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

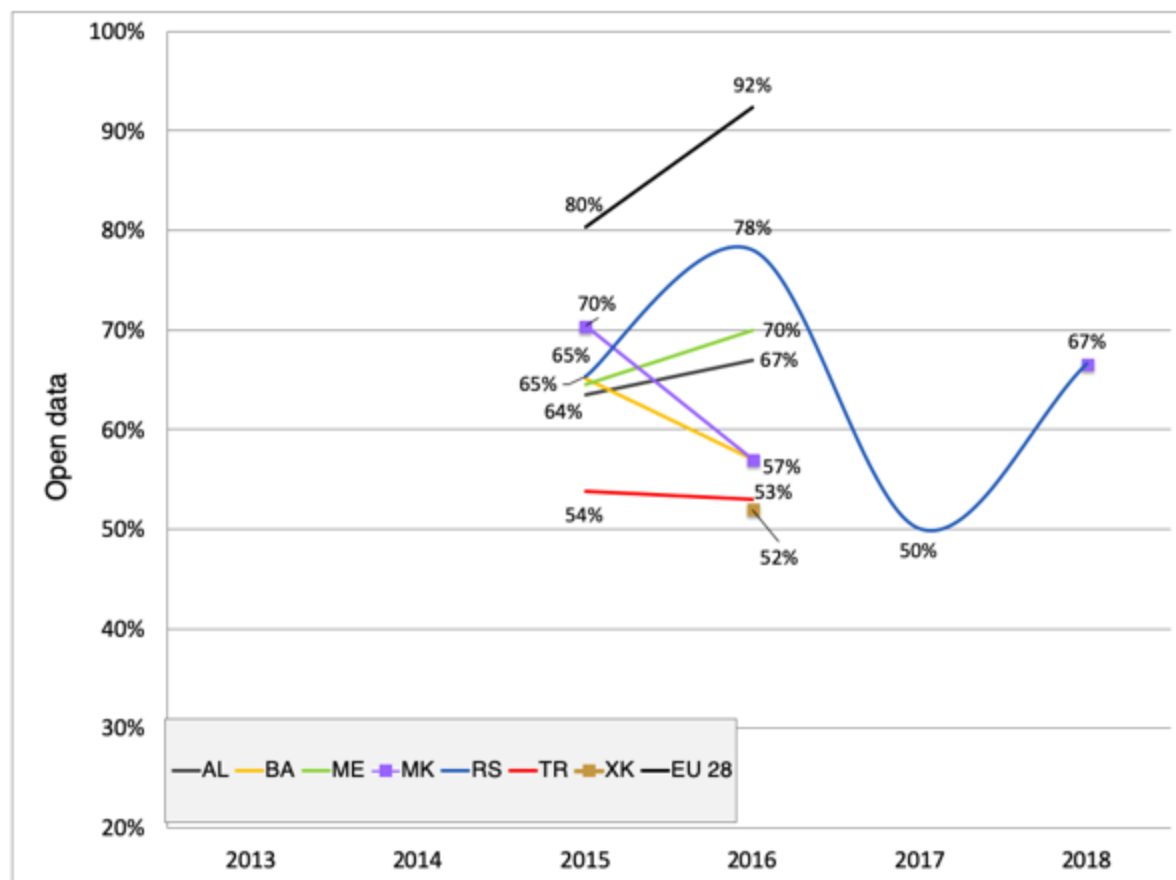
eGovernment services for businesses is a new DESI indicator included in the study for the first time this year. It broadly reflects the share of public services needed for starting a business and for conducting regular business operations that are available online for domestic as well as for foreign users<sup>55</sup>. Services provided through a portal receive a higher score, while services which provide only information (but have to be completed offline) receive a lower score. Like the preceding indicator information collection would need to be undertaken online using clearly structured methodology.

Only Serbia was able to provide the information.

<sup>55</sup> [http://ec.europa.eu/information\\_society/newsroom/image/document/2018-20/5\\_desi\\_report\\_digital\\_public\\_services\\_B5DBE542-FE46-3733-83C673BB18061EE4\\_52244.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2018-20/5_desi_report_digital_public_services_B5DBE542-FE46-3733-83C673BB18061EE4_52244.pdf)

## 5. The digital public services dimension

### 5A.5 Open data



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Open data statistics were collected by the study team from the Open Data foundation<sup>56</sup>. The EU28 average was calculated from the 22 Member States included in Open Data Foundation research. The last data available from the Open Data Foundation was for 2016.

The 2018 DESI report appears to use a different methodology, providing data for EU28 Member States up to 2017 (EU28 average 72 in 2017 and 59 in 2016).

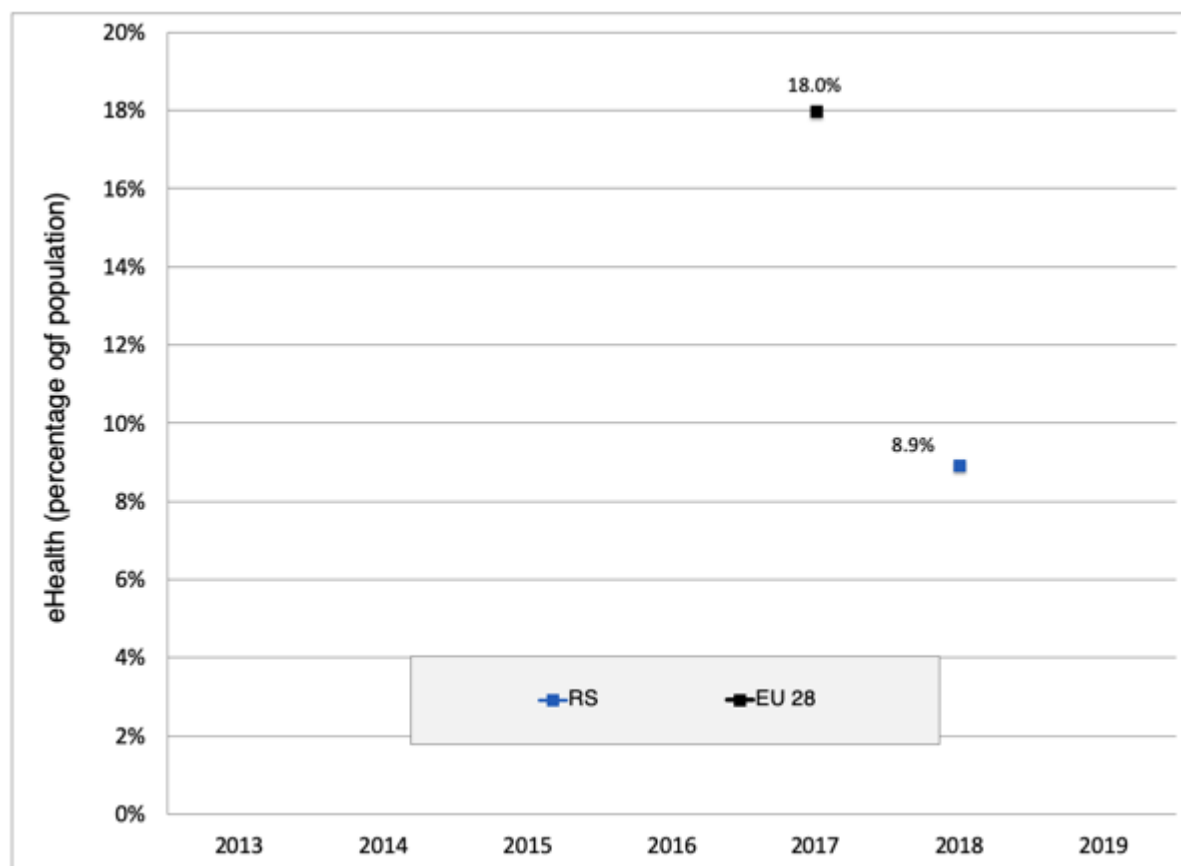
In the 2018 report only two data points were provided. Thus in this report, to provide more fulsome comparative insights, Open Data Foundation results are presented.

It is hoped in next year's survey more economies will be able to provide information using the DESI methodology. North Macedonia and Serbia provided data for 2018. This appears to be compatible with the DESI methodology, both reported a score of 67 per cent. If this interpretation is correct both would be close to the EU28 benchmark.

<sup>56</sup> <https://opendatabarometer.org/4thedition/data/>

## 5. The digital public services dimension

### 5B.1 eHealth



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

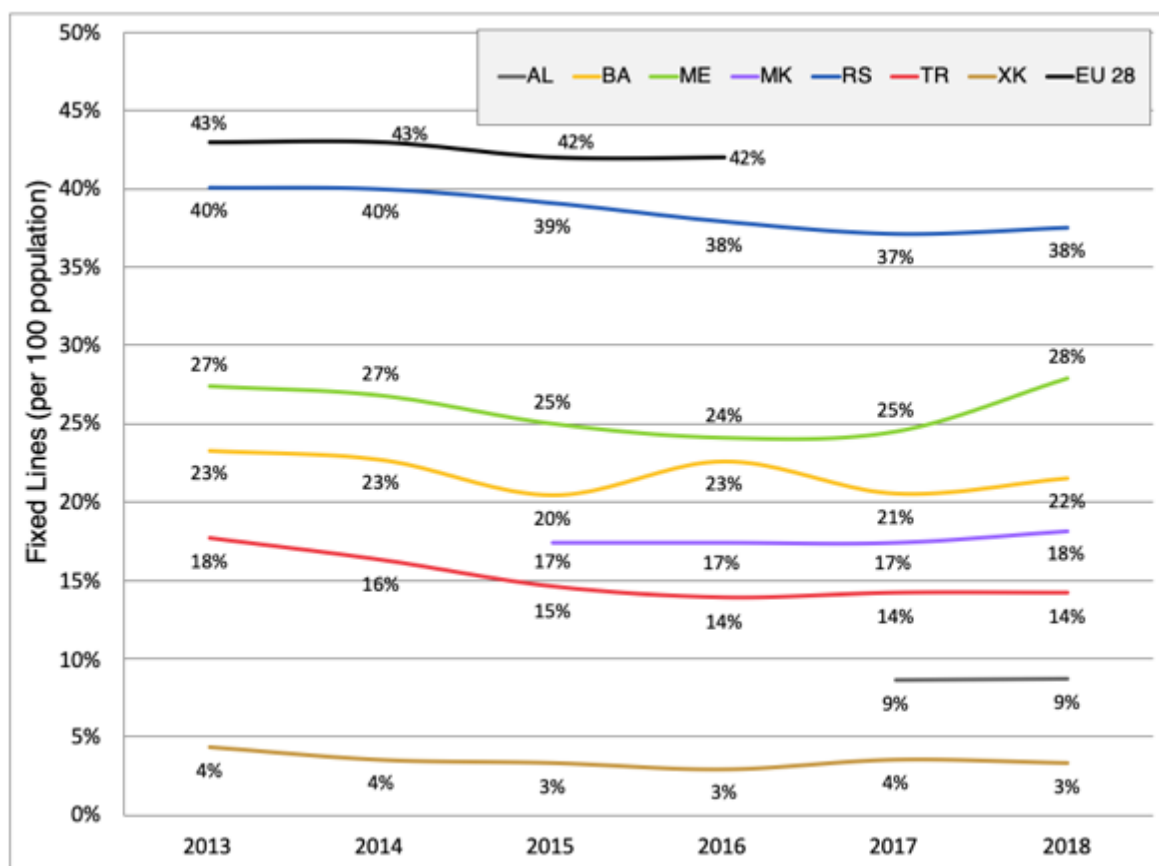
eHealth services are a new DESI indicator included in the study for the first time this year<sup>57</sup>. The EU report that on average in 2017 only 18 per cent of EU citizens have used health and care services provided online.

Only Serbia reported information – 8.9 per cent in 2018.

<sup>57</sup> [http://ec.europa.eu/information\\_society/newsroom/image/document/2018-20/5\\_desi\\_report\\_digital\\_public\\_services\\_B5DBE542-FE46-3733-83C673BB18061EE4\\_52244.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2018-20/5_desi_report_digital_public_services_B5DBE542-FE46-3733-83C673BB18061EE4_52244.pdf)

## 6. The telephony and market revenue dimension

### 6A.1 Fixed lines



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about usage of fixed lines<sup>58</sup> was reported by all six of the Western Balkans economies and Turkey. All of these economies have performed at lower levels when benchmarked against the EU28 average of 42 fixed lines per 100 population in 2016.

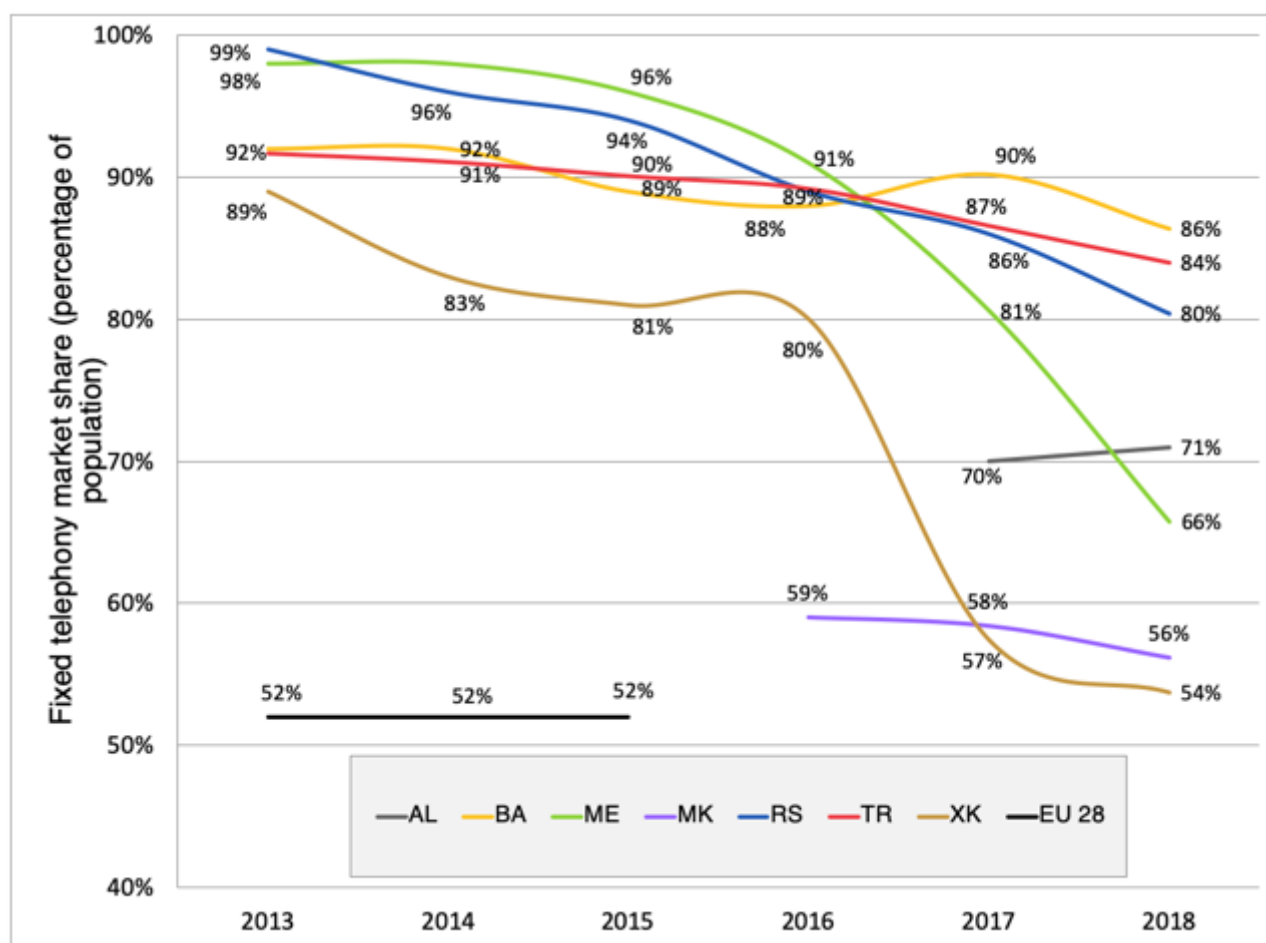
A lower level of fixed telephone lines is probably due to operators and users bypassing fixed landlines technologies and instead investing to promote greater use of mobile connectivity. Indeed, the declining situation in EU28 shows this may also be the case in EU Member States.

Comparison shows that Serbia is the closest economy to demonstrating a score near to the EU28 benchmark with 38 per cent fixed lines in 2018. All economies present relatively steady figures with limited change between 2013 and 2018.

<sup>58</sup> Calculated by dividing the number of fixed telephone lines by the population and multiplying by 100. For ease of understanding the figure presents information as a percentage. [http://www.un.org/esa/sustdev/natlinfo/indicators/methodology\\_sheets/econ\\_development/fixed\\_telephone\\_lines.pdf](http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/econ_development/fixed_telephone_lines.pdf)

## 6. The telephony and market revenue dimension

### 6A.2 Fixed telephony market share



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about fixed telephony market share was provided by all six of the Western Balkans economies and Turkey. For this indicator, lower scores are advantageous as they represent greater competition within markets<sup>59</sup>. When benchmarked against the EU28 average between 2013 and 2015, each of these economies has reported a greater fixed telephony market share for incumbent operators than the EU28 average. Nonetheless, where trend data is available all (except Albania, with a one per cent increase 2017 to 2018) have recorded a steady decline in the incumbent operators market share; indicating increased competition.

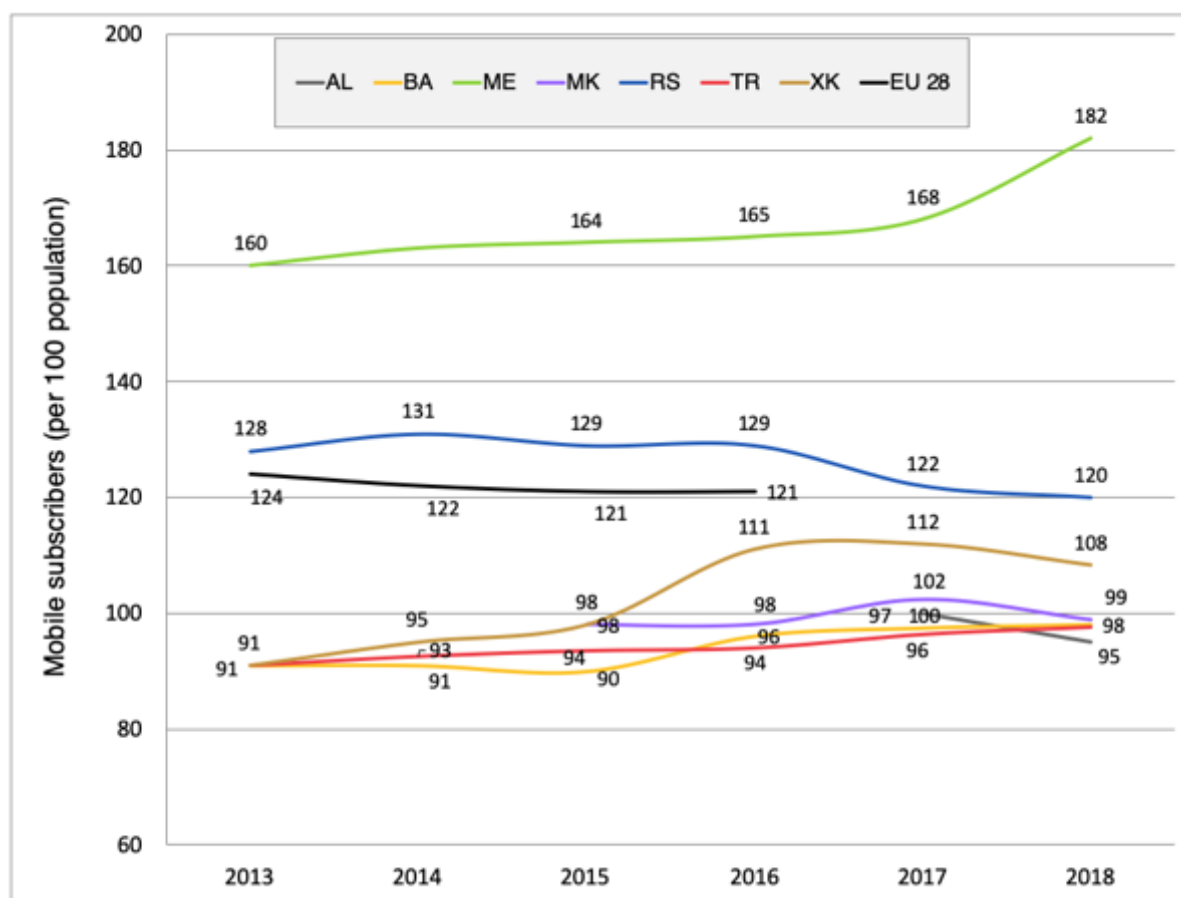
Kosovo (54 per cent) and North Macedonia (56 per cent) present the lowest scores in 2018.

<sup>59</sup> This indicator is one of four in this study where a lower score indicates better performance (the others are 1E.1, 2A.1B and 6B.2). Shading to indicate performance elsewhere in this study reflects this transposition.



## 6. The telephony and market revenue dimension

### 6B.1 Mobile telephony subscribers



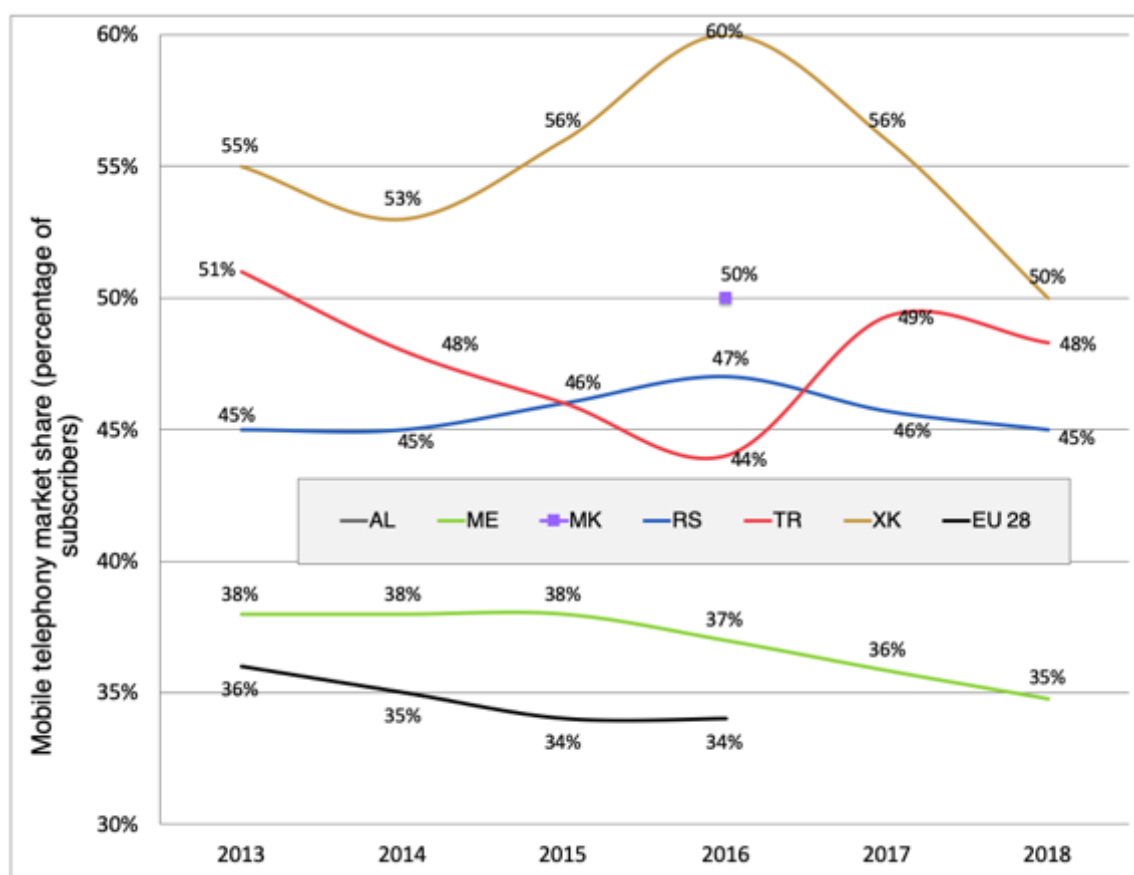
Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about the number of mobile telephony subscribers per 100 of the population was provided by all six of the Western Balkans economies and Turkey.

Montenegro showed the highest levels of uptakes across all six years with the highest number of subscribers - 182 – recorded in 2018. Serbia followed as the second highest with 120 subscriptions per 100 of the population. Both economies performed better than the EU28 average for 2016 which is the latest available data.

## 6. The telephony and market revenue dimension

### 6B.2 Mobile telephony market share



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about operator's market share by subscriptions<sup>60</sup> was reported by all five Western Balkans economies and Turkey<sup>61</sup>. For this indicator, all of the leading mobile operators in each of the observed economies experienced a higher proportionate market share than observed in the EU28 in 2016 (34 per cent).

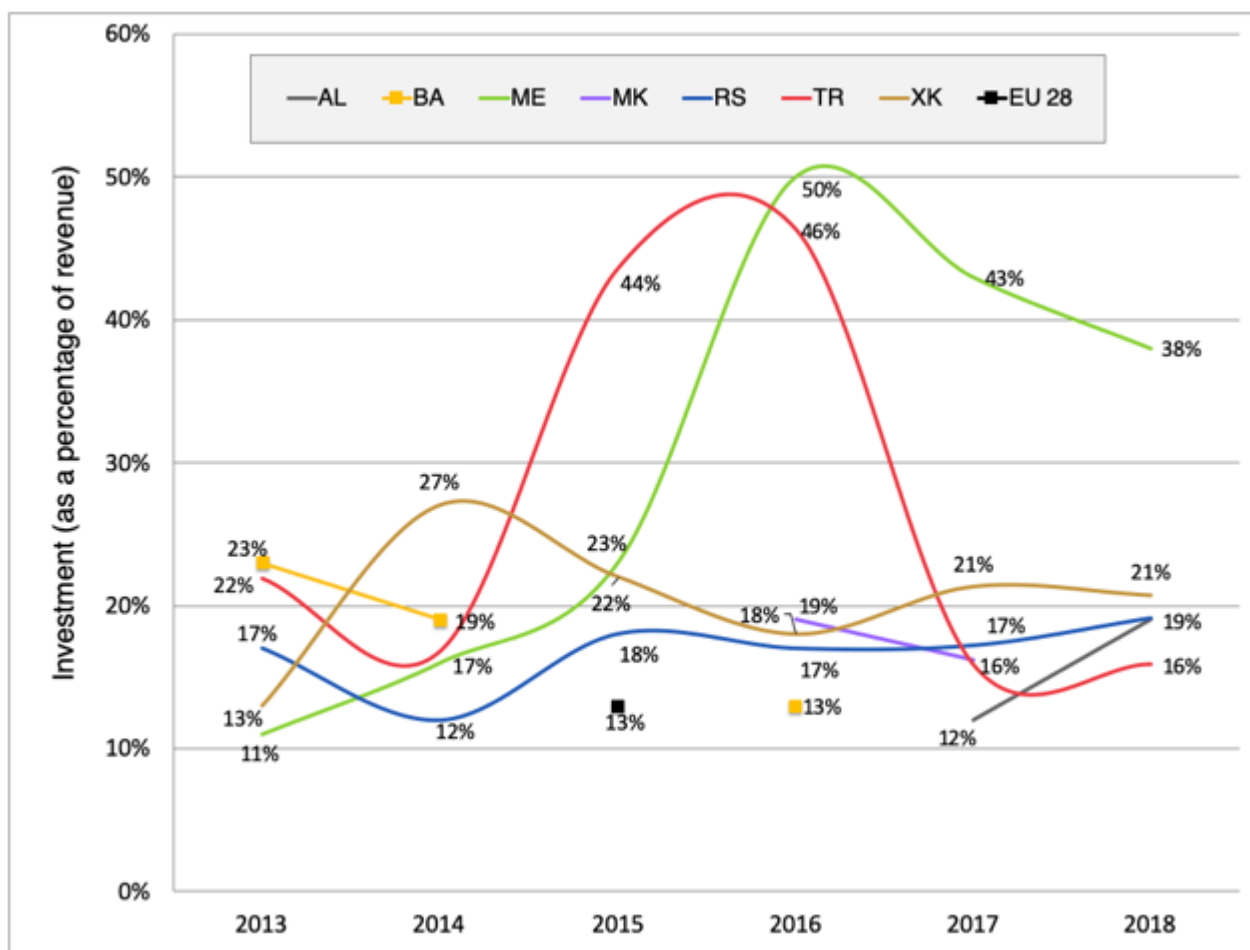
Kosovo (50%) reports the highest mobile market share, followed by Turkey (48%), Serbia (45%) and Montenegro (35%) in 2018.

<sup>60</sup> Leading mobile operator's market share by subscriptions for the year (%).

<sup>61</sup> This indicator is one of four in this study where a lower score indicates better performance (the others are 1E.1, 2A.1B and 6A.2). Shading to indicate performance elsewhere in this study reflects this transposition.

## 6. The telephony and market revenue dimension

### 6C.1 Investment as a percentage of revenue



Source: Tech4i2 data collected from primary research. EU28 data from Eurostat.

Information about Investment as a percentage of revenue in electronic communications<sup>62</sup> was provided for five economies in 2018. The relatively high levels of fluctuation observed in some countries in last year's report are once again evident.

Montenegro (38 per cent) has the highest investment percentage in 2018, followed by Kosovo (21 per cent) and Serbia (19 per cent).

In the last year reported after 2016 by economies all had higher levels of investment than the EU28 average, for which the latest reported data was 2015.

<sup>62</sup> Investment as a percentage of revenue in electronic communications

