



# Examining the Linking Patterns and Link Building Strategies of Mainstream and Partisan Online News Media in Central Europe

Andrea Hrckova<sup>(✉)</sup> , Robert Moro , Ivan Srba , and Maria Bielikova 

Faculty of Informatics and Information Technologies,  
Slovak University of Technology in Bratislava, Bratislava, Slovakia  
{andrea.hrckova,robert.moro,ivan.srba,maria.bielikova}@stuba.sk

**Abstract.** The presence of external links or sources in the articles are considered as one of the indicators for assessing their quality by a librarian and information community. In this article, we explore linking patterns of the most popular traditional and “alternative” (partisan) digital news media in two V4 countries of Central Europe: Czech and Slovak Republic. Alternative/partisan news media are understood as media that protest against traditional or mainstream media. Fake news as articles containing disinformation can appear in traditional media (e.g. in tabloids) as well as in alternative media. Eighteen most popular mainstream news media and fifteen most popular partisan media in Slovakia and Czech Republic were selected for quantitative and qualitative analysis of links. With this method, more than 171 million of unique domains of hyperlinks from and to the selected online media were collected and analyzed. The argument to conduct this type of research is that partisan news media are gaining popularity in the countries of Central Europe and the linking patterns of these media were rarely examined or compared with traditional media. Quantitative analysis and visualization of hyperlinks was performed using two software systems: Ahrefs and Gephi. We concluded that there are some differences between the linking patterns of mainstream and partisan digital news media that need the research attention not only to follow the communication patterns of digital media, but also to be able to detect the type of the news media automatically.

**Keywords:** Fake news · Online news media · Alternative media · Partisan media · Mainstream media · Traditional media · Link building · Hyperlink network analysis

## 1 Introduction to Partisan and Mainstream Online News Media

Fake news, as species of disinformation [5], are understood as news articles that are intentionally and verifiably false and could mislead readers [1]. This definition

is rudimentary in theory, but the borders of truth in the news media are more blurred in practice. Some online media combine truth with lies, somehow manipulated or one sided opinions, whether it is yellow journalism or biased news with clickbait articles or even real fake news with manipulated images (photoshopping) or videos (deep fake), portals with PR articles or content farms [6].

Therewith, the traditional (mainstream) or in other words established online media are also being attacked by some newcomers to the media scene as “hysterical media that annoy the public by analyzing “lies” as a phenomenon of the times” [15] that behave the same or worse than “conspiracy media”, referring mainly to Chomsky and Herman [4]. According to these portals, the goal of these mainstream “truthloving media” is to “indoctrinate the educated and fool the masses” [8]. Some of these portals use an implicit language, stating that “nobody will dictate them, what they write” (Parlamentne listy). To categorize these portals for the purpose of this article, we utilize the term “alternative” or “partisan” media, as they defined themselves against the mainstream (or traditional/established) media.

The online mainstream (or traditional) media are for the purpose of this article defined as media news portals that usually have all the attributes of credible news media: the real name of author and publisher, listed on each website and employing journalists doing fieldwork, whether it is tabloid or serious news. It is important to note that in different countries, the concept of “alternative” and “traditional” media may differ. In Slovakia and Czech Republic alternative media are mostly the media, marked as fake or conspiracy news by some fact checkers (as e.g. konspiratori.sk) that gives them a negative connotation. These media are also connected by their pro-Russian attitude as an “alternative” to the pro-western traditional media. In Hungary, the traditional and established media are mostly owned by pro-government bodies and the real alternatives to these media have a weak position in the news media landscape [9]. In Poland many pro-government right wing media claim to be “alternative” and for the opposition’s supporters, completely other online news media are considered “alternative” [13]. Therefore, the term “partisan media” is preferred in this article.

Nevertheless, the focus of this article is not to analyze the concept of truth or the pro- or anti-government attitude of these media. The objective of this article is to analyze the external hyperlinks and linking patterns between the so called mainstream (traditional) and partisan (alternative) media in Czech and Slovak republic and thus assist with the detection of linking patterns as one of the indicators to automatically determine the type of these media. With this objective in mind, these research questions were set: What is the position of alternative/partisan news media in the online news media landscape in Slovak and Czech Republic? Are the (crawlable) linking patterns different in traditional and partisan online news media? Who are the main actors in the networks?

## 2 Research Antecedents

As a methodology to study hyperlinks among websites, Jackson [7] first suggested that the social network analysis (SNA) methods are applicable. SNA is

a research method for identifying structures or patterns between social entities in various social systems based on the relations among the system components (or nodes) rather than on the attributes of individual actors [12]. Hyperlinks are technological capabilities that enable websites or web pages to link with another, but also to exchange information, and maintain cooperation between actors with common background, interest, or projects [10]. A website therefore functions as a node that passes messages from one actor to another and patterns of hyperlinks reflect the communicative choices of the owner [7]. Likewise, external hyperlinks to the websites are set as the indicators of web content quality by search engines like Google, similarly as the citations in the documents. As soon as the number and quality of hyperlinks started to be a part of evaluation of websites by search engine algorithms, the practices of link building as a strategy of creating links on websites within the search engine optimization methods have been widespread. Moreover, the citation analysis is a widespread method for analyzing scholarly articles to determine the cooperation between scholars, therefore hyperlink network analysis (HNA) method might enable the analysis of cooperation on internet websites.

Park [10] mentions four areas of research, where hyperlink network analysis can be utilized: e-commerce and the communication on international, interpersonal and interorganizational level. Park and Thelwal [11] then analyzed hyperlink patterns and social structure on politicians' websites in South Korea. Other authors that utilized HNA for analyzing media are Szabo and Bene [14]. The research objective of these authors was to analyze the position of radical right mass communication channels in the media sphere in Hungarian media network. Nevertheless, HNA, despite its long tradition, remains underutilized in terms of media communication and SNA in social networks is a more common method to analyze data also in the field of fake news and rumors detection. With this article, we show that HNA still reveals important information about the media relationships and linking patterns of media – both traditional and partisan.

The analysis of web hyperlinks structure is also considered as part of webometric research. Webometrics is “the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the web drawing on bibliometric and informetric approaches” [2]. However, in the field of untrustworthy sources, webometrics as a method is associated especially with the analysis of hyperlinks in scientific resources, as e.g. in the article of Bowler, He and Hong [3] that were researching the hyperlinks between websites and blogs in medical domain.

### 3 Methodology

Two software systems were utilized to obtain and analyze the data: Ahrefs<sup>1</sup> and Gephi<sup>2</sup>. Ahrefs is a crawler, the original purpose of which is to serve search marketing professionals. It collects, processes and stores data, consisting of hyper-

<sup>1</sup> <https://ahrefs.com/>.

<sup>2</sup> <https://gephi.org/>.

links, keywords and user behavior. Using commercially available crawlers to discover hyperlinks between websites has been a common practice in webometrics [2]. AhrefsBot is also mentioned as the second most active crawler on the internet after Googlebot [16]. Gephi is an open source software for visualization and exploration of graphs and networks, applicable also for link analysis. Thanks to Gephi visualizations, the networks of directed hyperlinks from and to the online news media and the importance of some nodes, based on the automatic calculation of the sum of hyperlinks will be visible.

Data from the most popular Czech and Slovak online news media were obtained throughout July and August 2019 with Ahrefs tool. The popularity of the mainstream news media was identified by available statistics (e.g. Aim monitor) and the popularity of partisan media, where official statistics are often missing, the number of fans on Facebook or the number of hyperlinks was selected as a presumption of their popularity. We selected seven websites of Slovak partisan web media (Dolezite, Hlavne spravy, Infovojna, Parlamentne listy, Protiprud, Slobodny vysielac, Zem a vek) and nine websites of Slovak mainstream media (Aktuality, Cas, Dennik N, Hnonline, Pluska, Pravda, Sme, Topky, Webnoviny). In Czech Republic, where the news media scene is richer, ten websites of Czech partisan media (Ac24, Aeronet, Cesko aktualne, Cz.sputniknews, Parlamentní listy, Pravy prostor, Protiproud, Svobodne noviny, Svobodny vysilac, Zvedavec) and nine Czech mainstream web media (Aha, Blesk, Ct24, iDnes, iHned, Lidovky, Pravo, Reflex and Respekt) were selected. The complete list of the selected media with their description can be found in the appendix. The data that was of our particular interest was the number and domains of incoming and outgoing hyperlinks (robots do follow and also no follow) to and from the selected media.

These data were downloaded in .csv format and manually processed for the needs of Gephi in September 2019 (Table 1, Table 2). To define the weight of edges and the modularity class of the nodes, the number of all hyperlinks (with dofollow and nofollow attributes) was selected. The number of dofollow links was set as an additional attribute to analyze the data, because many of the analyzed hyperlinks had a nofollow attribute. Hyperlinks with nofollow attribute are not officially followed by the search engines and include hyperlinks from discussions or blogs. Hyperlinks with dofollow attribute are commonly considered to pass “weight” and help a website or URL to rank better in organic search results.

Data was also cleaned from hyperlinks to social networks, Google tag manager and hyperlinks created by link shorteners (like bitly). The duplicates were also merged and the sum of the hyperlinks in duplicates was calculated automatically by Gephi. Finally, we collected and analyzed more than 171 million of unique domains of hyperlinks from and to the selected online media (more than 160 million of hyperlinks from and to the mainstream media and more than 11 million of hyperlinks from and to the partisan media). The number of hyperlinks to and from mainstream news media is noticeable higher than the number of links of partisan news media as mainstream media are more established in the

news landscape and one of their link building strategies is buying smaller and specialized portals with online history and hyperlinks.

To visualize the data in the graph properly, Fruchtmann Reingold layout was selected. To filter the data, degree range  $n > 1$  and edge weight of  $n > 0.01$  of the total number of hyperlinks (total edge weight) was invoked. The graphs in the article are created from both dofollow and nofollow attributes.

**Table 1.** Structure of nodes prepared for the visualization in Gephi. Modularity class is the number of all hyperlinks with both dofollow and nofollow attributes

ID	Label	Modularity class	Dofollow
1221022	auto.cz	20874449	20874443
1221023	blesk.cz	7558503	7510575
1221024	reflex.cz	2803439	2803439

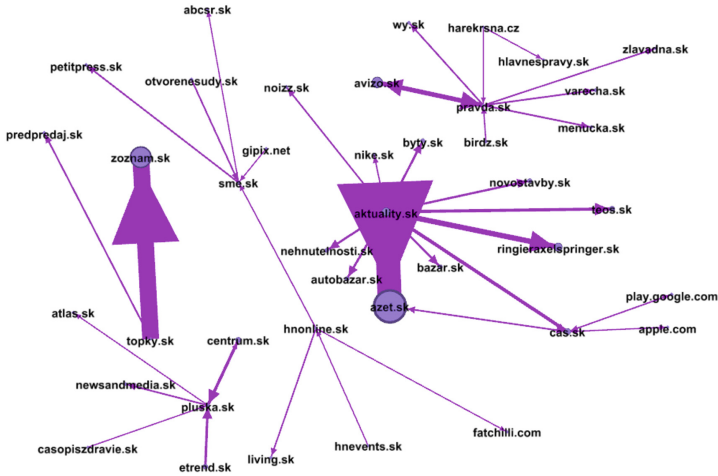
**Table 2.** Structure of edges prepared for the visualization in Gephi. Weight is computed the same as the modularity class, i.e., as the number of all hyperlinks with both dofollow and nofollow attributes.

ID	Source	Target	Weight	Dofollow
1221022	1221022	1222049	20874449	20874443
1221023	1221023	1222049	7558503	7510575
1221024	1221024	1222049	2803439	2803439

## 4 Results

### 4.1 What Is the Position of Alternative/Partisan News Media in the Online News Media Landscape in Slovak and Czech Republic?

The position of partisan media in the local news media landscape can be inferred from the graph of all hyperlinks from and to the most popular mainstream and partisan media of the researched country. The graph suggests that there are separated traditional media clusters with more than one million hyperlinks. In this graph (Fig. 1), one popular partisan medium (Hlavne spravy) can be spotted that is co-linked with a traditional medium by a questionable domain. When analyzing this traditional medium (Pravda.sk), its new owner is also the owner of some partisan media. Therefore, we assume that there is one partisan medium (Hlavne spravy) that has a weak position in the online media landscape in our country.



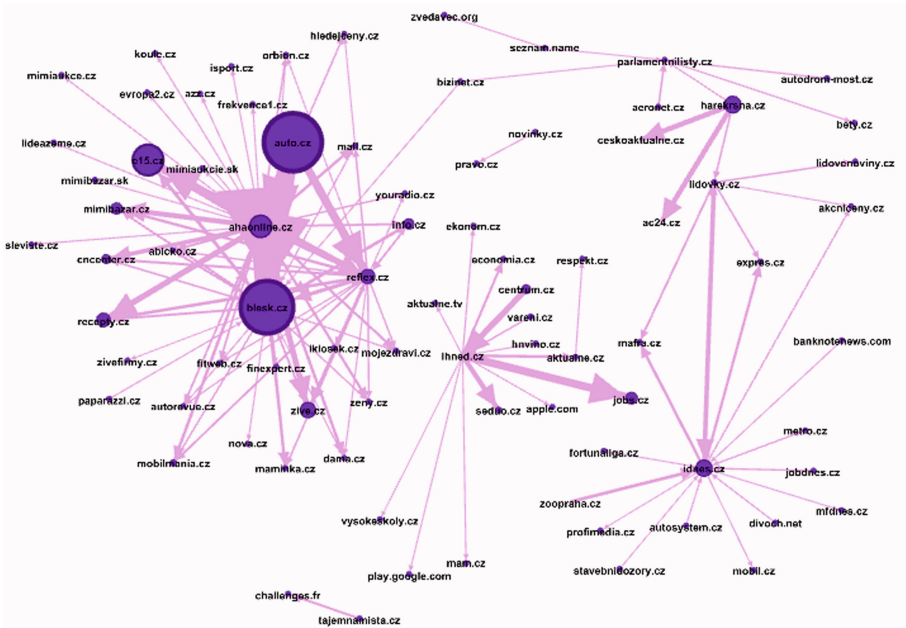
**Fig. 1.** Network of directed hyperlinks from and to the most popular Slovak partisan and traditional media

According to the analysis in Ahrefs tool, Slovak traditional media rarely link to partisan media, except of tens of thousands of outgoing nofollow links from the mainstream media blogs. We assume that guest blogging is one of the popular link building practice of Slovak partisan media. Although these links are marked as nofollow for the search engines, they are visible for the users and thus connecting the partisan media scene with the mainstream media. Pravda.sk is the only Slovak traditional medium that links heavily with dofollow links to partisan media – more than nine thousand to the most popular alternative medium Hlavne spravy and almost seven thousand to Sputnik news.

The situation is different in Czech Republic, where three big clusters of traditional and partisan news media are visible (Fig. 2). Half of one cluster on the right side belongs to the partisan news media (ceskoaktualne, az24, zvedavec and parlamentnilisty), all linked with a questionable portal harekrsna.cz. This portal also links these news media to the mainstream media (idnes and lidovky), owned by a Czech politician and millionaire. According to this HNA, partisan news media have nowadays a stronger position in Czech news media landscape than in Slovakia.

**4.2 Are the Linking Patterns Different in Traditional and Partisan Media? Who Are the Main Actors of the Networks?**

Different linking patterns can be found between partisan news media and mainstream news media. The clusters of the hyperlinks from and to the mainstream media correlated with the ownership (publisher) of these media both in Slovak (Fig. 3) and Czech Republic (Fig. 4). There seems to be only one exception (hyperlinks between two media sme.sk and hnonline.sk of different ownership),



**Fig. 2.** Network of directed hyperlinks from and to the most popular Czech traditional and partisan news media

but a deeper analysis of Ahrefs results revealed that this number of hyperlinks was created due to redirections of one subdomain in one media to another. This was caused probably because of the transfer of ownership between these two subdomains. The other links were usually automatic interlinks between these portals. This result of individual clusters suggests independence and separateness of the researched mainstream media and/or unwillingness to link to the “competition”.

Analyzed partisan media (both Slovak and Czech) create a denser and more interlinked network that confirms their interdependence in the network. Six co-cited (co-linked) Slovak alternative media nodes can be spotted in contrast with traditional Slovak media, where the network consists of usually separated clusters. The graph (Fig. 5) shows also partisan portals with highest importance in the network: *dolezite.sk*, *infovojna.sk* and *hlavnespravysk.sk*. The first two link massively both to traditional and partisan media that is a very different linking pattern from traditional media that (with one above mentioned exception) rarely link to partisan media. Slovak partisan media position themselves as parts of the online news media landscape and the hyperlinks to the established media might at first glance look like an indication of their credibility. Nevertheless, this is valid only for Slovak domains, Czech alternative news media do not usually link to the mainstream media. In Czech partisan online news media landscape, the





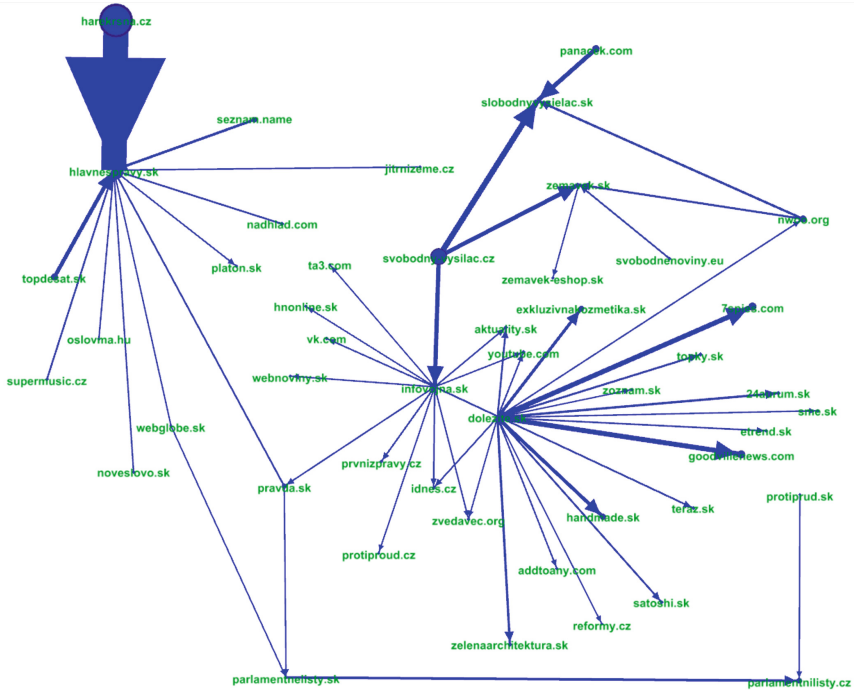


Fig. 5. Network of directed hyperlinks from and to Slovak partisan online news media

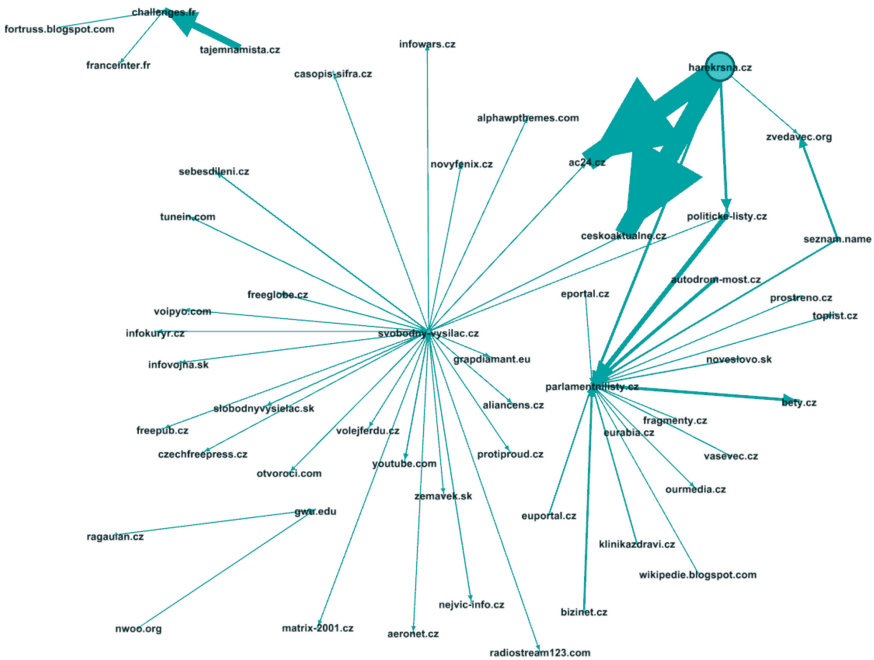


Fig. 6. Network of directed hyperlinks from and to Czech partisan online news media



article. Mainstream online news media create hyperlink clusters within their own publisher. More context would be provided to the reader, if these news media of different publishers were interlinked. However, it is not the case of selected traditional media, and the advantage of this fact is that the ownership of these news media can be reliably inferred from the hyperlink structure. Another important conclusion is that mainstream online news media that do not share the same publisher with partisan media, never link heavily to the mainstream online news media of another state, even if they share the same publisher.

Partisan news media are much more interlinked between the clusters within one state, but also within two independent states. This fact suggests either their interdependence or partnership in the “partisan fight” against mainstream media or the same ownership as is the case of mainstream media. Nevertheless, if alternative and mainstream news media have the same owner, this fact is also visible in the interlinkage of these media. The position of partisan news media in the news media landscape differs in Czech and Slovak Republic. While Slovak partisan media link also often to the mainstream news media (it is not common vice versa with dofollow attribute), Czech partisan news media have a stronger position in the news media landscape and are not interlinked with different mainstream news media.

Two limitations of this research were identified. The first limitation is the focus on the online news media landscape of two states: Czech and Slovak Republic. However, this limitation is necessary, as the definition and scope of alternative and mainstream media differs in different countries and countries with a similar situation needed to be selected. Repeating this research with the same research methods, but in different countries is therefore suggested.

The second limitation is the restriction of the research to the links that are crawlable by robots. Some traditional media are under paywall and their links remain not crawled. Nonetheless, the hyperlinks to the affiliated media surely are crawlable and crawled by robots as hyperlinks with dofollow attribute serve also for the search engine optimization of these portals. Part of the sources, especially in alternative news media remain listed as pure text and part of sources are not stated at all. This proves that the hyperlink analysis does not serve as citation analysis of the sources, but rather as an analysis of cooperation between the selected actors.

As future work, we are interested in qualitative analysis and testing the identified features or linking patterns (e.g. links, dofollow links, etc.) as predictors of the news media credibility. Also, it is worth researching the spreading patterns of the information across the different media and different languages (e.g., English and Russian as the most relevant ones for the Central European media landscape).

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## Appendix

Overview and scope of Slovak partisan online news media analyzed in this article:

- [www.dolezite.sk](http://www.dolezite.sk) - News hub
- [www.hlavnespravdy.sk](http://www.hlavnespravdy.sk) - Politics, army, interesting facts from technologies and popculture. Conservative targeting
- [www.infovojna.sk](http://www.infovojna.sk) - Politics, army
- [www.parlamentnelisty.sk](http://www.parlamentnelisty.sk) - Politics
- [www.protiprud.sk](http://www.protiprud.sk) - Politics, health, spiritual, conspiracies
- [www.slobodnyvysielac.sk](http://www.slobodnyvysielac.sk) - Politics, conspiracies, culture
- [www.zemavek.sk](http://www.zemavek.sk) - Health, spiritual, “science”, society

Overview and scope of Slovak mainstream online news media analyzed in this article:

- [www.dennikn.sk](http://www.dennikn.sk) - Politics, science, culture, sport, environmental issues
- [www.hnonline.sk](http://www.hnonline.sk) - Finance, politics
- [www.pluska.sk](http://www.pluska.sk) - Showbusiness, politics, sport. Tabloid
- [www.pravda.sk](http://www.pravda.sk) - Politics, finance, sport, culture, auto-moto, health and cooking
- [www.sme.sk](http://www.sme.sk) - Politics, economy, sport, culture, technologies, health, environmental issues
- [www.topky.sk](http://www.topky.sk) - Politics, showbusiness, leisure. Tabloid
- [www.webnoviny.sk](http://www.webnoviny.sk) - Politics, finance, sport
- [www.aktuality.sk](http://www.aktuality.sk) - Politics
- [www.cas.sk](http://www.cas.sk) - Showbusiness, politics, sport. Tabloid

Overview and scope of Czech partisan online news media analyzed in this article:

- [www.ac24.cz](http://www.ac24.cz) - Politics, army, “science”
- [www.aeronet.cz](http://www.aeronet.cz) - Politics, technologies
- [www.ceskoaktualne.cz](http://www.ceskoaktualne.cz) - Politics, health, culture, finance, army, conspiracies and factoids
- [www.cz.sputniknews.com](http://www.cz.sputniknews.com) - Politics
- [www.parlamentnilisty.cz](http://www.parlamentnilisty.cz) - Politics
- [www.pravyprostor.cz](http://www.pravyprostor.cz) - Politics, society
- [www.protiproud.cz](http://www.protiproud.cz) - Politics, health, spiritual, conspiracies
- [www.svobodnenoviny.eu](http://www.svobodnenoviny.eu) - Anti-migrant, conspiracies, mysteries, health
- [www.svobodny-vysilac.cz](http://www.svobodny-vysilac.cz) - Politics, spiritual, conspiracies, culture
- [www.zvedavec.org](http://www.zvedavec.org) - Politics, army, society, anti-LGBTI and migrants

Overview and scope of Czech mainstream online news media analyzed in this article:

- [www.ahaonline.cz](http://www.ahaonline.cz) - Leisure, showbusiness. Tabloid
- [www.blesk.cz](http://www.blesk.cz) - Leisure, showbusiness, politics. Tabloid
- [www.ct24.ceskatelevize.cz](http://www.ct24.ceskatelevize.cz) - Politics, finance, culture, science, sport
- [www.idnes.cz](http://www.idnes.cz) - Politics, finance, culture. Tabloid

- [www.ihned.cz](http://www.ihned.cz) - Politics, finance, culture, technologies
- [www.lidovsky.cz](http://www.lidovsky.cz) - Politics, finance, culture, leisure
- [www.pravo.cz](http://www.pravo.cz) - Politics, leisure, finance
- [www.reflex.cz](http://www.reflex.cz) - Politics, interesting facts, culture
- [www.respekt.cz](http://www.respekt.cz) - Politics, culture, society

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