The technology of compression coding of video data for information communication systems of the air segment is being studied. Distinctive features of the developed technology are the following: structural decomposition of the information space by structural feature; the use of a two-hierarchical scheme of statistical coding. A feature of the proposed technology is the use of a statistical approach in the process of forming the informational part of the codegram and the marker (identifier) of the code structure in the original code sequence. This makes it possible to create conditions for localizing the action of errors that occur in the process of video data delivery in the air segment info-communication systems. A model for evaluating the effectiveness of the proposed video data compression coding technology is created. A feature of the created model is the use of both quantitative and qualitative indicators of data distortions of the video information resource under the conditions of errors in the data transmission channels. A comparative analysis of the developed technology with lossless coding methods (Huffman method) and existing compression coding technologies built on the basis of the JPEG platform is carried out. The advantages of the proposed technology are the provision of localization of the action of errors due to the use of additional service information (identifiers) about the code structure, which is formed in the process of statistical coding of the data of the video information resource.

Keywords: video image, structural sign, restructuring, coding, reliability.

Introduction

Formulation of the problem. Today, video information coding technologies are being actively researched and improved [1–8]. This is due to the active use of the video resource as a means of information provision to increase the efficiency of management at all levels. It should be noted that one of the priority means for obtaining video data is the aerial segment, which today is represented by a number of unmanned aerial vehicles and aviation complexes [9–13]. The relevance of the use of the specified sector is related to the possibility of receiving video information in a timely manner in conditions of ensuring the properties of scale, mobility to ensure a timely response to crisis situations arising in society and the state as a whole.

It should be noted that the means of the air segment are quite actively used to monitor critical infrastructure objects [14–16]. This is due to the need for prompt and reliable information support of the relevant situational centers for the purpose of prompt response of departmental bodies to crisis situations.

In turn, the delivery of video information in special purpose information communication systems (air segment) is associated with a number of problematic factors [4; 17–18]: presence of interference in data transmission channels; limiting the bandwidth of data transmission channels using wireless communication technologies.

The above-mentioned problematic factors can lead to a decrease in the level of reliability of video data in the conditions of the occurrence of errors in data transmission channels during the reconstruction of video images [19].

In turn, the use of existing technologies for encoding video data leads to an imbalance between indicators of efficiency and reliability [20–26].

In connection with this, the issue of finding fundamentally new approaches to the video data encoding process, which will allow creating conditions for harmonizing compression characteristics with noise immunity (reliability), becomes urgent.

Therefore, an urgent scientific and applied task is to increase the efficiency of video data coding for air segment info-communication systems from the point of view of ensuring the required level of reliability.

The purpose work is the development of a model for evaluating the effectiveness of video data compression coding technology from the point of view of ensuring the required level of reliability under the conditions of errors in the data transmission channel and a comparative analysis with existing technologies.

Analysis of recent research and publications. Analysis of the latest scientific publications indicates that at present two directions are quite actively used for coding the data of the video information resource.
1) compression technologies implemented on the basis of conceptual approaches of JPEG family algorithms [28; 30–33];

2) existing technologies of interference-resistant coding (Hemming codes, Bowes–Chowdhury–Hawkingham codes (BCH), Reed Solomon codes, etc.) and their modifications [27; 29].

It should be noted that each direction solves a separate problem. So, if the main goal of the first is a compact presentation of coded data, which allows you to agree with each other such quantitative indicators as the volume of coded video data and the bandwidth of the data transmission channel [34–37]. Thus, the main purpose of the first direction is to control the quality of the source code sequence to increase the level of efficiency of video data delivery in special purpose information communication systems.

In turn, the main purpose of using the second direction is to ensure the immunity of the original code sequence by using additional correction bits [20; 29]. This is especially relevant for information communication systems using wireless communication technologies [3–4]. Moreover, the amount of additional correction bits directly depends on the following quantitative indicator – the frequency of errors that occur in the process of video data delivery [30; 36]. Thus, the main purpose of the first direction is the controlled management of the quality of the output code sequence to increase the level of reliability of video data in special purpose information communication systems (air segment) under the conditions of errors in the process of video data reconstruction.

Thus, simultaneous provision of the required level of operational efficiency and reliability in information communication systems using wireless video data transmission technologies is possible only under the condition of synthesis of technologies implemented in both directions.

In turn, in the works [38–42] proposed a fundamentally new approach, which involves the use of restructuring of the information space on a quantitative basis. This makes it possible to create conditions for increasing the efficiency of using a statistical approach in the process of video data delivery in air segment information communication systems.

Therefore, the purpose of the article is to create a video data reliability assessment model for compression coding technology under the conditions of errors in the data transmission channel.

**Statement of the main material**

To increase the efficiency of video data coding for the ICS of the air segment, it is proposed to use a compression technology built on the basis of a two-hierarchical scheme of statistical coding with clustering (TSCC). The algorithm of the proposed coding scheme is shown in Fig. 1. A feature of the use of the specified coding scheme is the use of a statistical approach to form both the informational (uneven code structure assigned to the cluster element) and the service part of the codegram (the cluster marker to which the informational code part belongs).

This makes it possible to create conditions for increasing the level of reliability of video data in the presence of errors in data transmission channels.

Next, it is proposed to conduct an analysis of the effectiveness of the proposed compression coding technology in terms of quantitative and qualitative indicators. For this purpose, it is necessary to create an appropriate evaluation model.

**Comparative analysis of quantitative assessments of the level of reliability of video data at a given level of errors for the developed and existing coding technologies**

The use of the aero-segment involves the fulfillment of a number of requirements for video information resource (VIR) from the point of view of ensuring the required level of reliability, which are listed in Table 1. The requirements specified in Table 1 are formed taking into account:

- results of practical research [38; 40; 42];
- analysis of QoS system indicators (quality of service);
- requirements for providing video information in critical infrastructure systems [14–15].

**Table 1**

<table>
<thead>
<tr>
<th>No</th>
<th>Indicator</th>
<th>Necessary value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peak signal-to-noise ratio $PSNR(\xi)$ under conditions of interference and interference in communication channels, dB</td>
<td>&gt;15–25</td>
</tr>
<tr>
<td>2</td>
<td>Number $\Omega$ of distorted pixels affecting the quality of visual perception, %</td>
<td>7–8</td>
</tr>
<tr>
<td>3</td>
<td>Bit error probability under conditions of interference and disturbances in the communication channel, $P(\xi)$</td>
<td>$10^3$–$10^4$</td>
</tr>
</tbody>
</table>

Source: developed by authors.

A number of experimental studies were conducted to evaluate the effectiveness of the proposed compression coding technology. Test video images with different degrees of saturation were used as coded data [43–45]. Data transmission was simulated for a discrete symmetric channel without memory at the error levels specified in Table 1.

To evaluate the effectiveness of the developed com-
pression coding method from the point of view of increasing the reliability of the video information resource, the following quantitative indicators should be used:

1. The value of the peak signal-to-noise ratio at a given level of errors in the process of reconstruction of a video information resource, which is given by the following expression:

\[
PSNR(\varepsilon) = 20\log\left(\frac{u_{e_{\text{max}}}}{\sqrt{MSE(\varepsilon)}}\right),
\]

where \(PSNR(\varepsilon)\) is the value of the peak signal/noise ratio at a given level of errors in video information transmission channels for the developed method; \(u_{e_{\text{max}}}\) is the maximum value of the message element; \(MSE(\varepsilon)\) is the value of the root mean square deviation at a given level of errors in the transmission channels for the developed method of compression coding of video information.

The set \(\Lambda(U(\theta))\) of the sign of the number \(\lambda_i\) of series of units is determined

Distribution of message \(U(\theta)\) elements \(u_\xi\) by sets \(U(\lambda_i)\)

Code constructions \(\ell_{\lambda_i}\) of variable length \([\ell_{\lambda_i}]_2\) are defined, which are assigned to the elements of the corresponding clusters

Code constructs \(\ell_{\lambda_i}\) of variable length \([\ell_{\lambda_i}]_2\) are defined and assigned to clusters \(U(\lambda_i)\)

Formation of the element's \(u_\xi\) codegram \(\ell_{\xi,i}\)

Formation of the code sequence \(L(\theta)\)

Fig. 1. Algorithm of TSCC elements \(u_\xi\) message \(U(\theta)\) with the use of internal restructuring of data of the sign of the number \(\lambda_i\) of series of units

Source: developed by authors.
2. The value of the root-mean-square deviation for the developed coding method at a given level of errors in video information transmission channels, which is determined by the following expression:

\[ \text{MSE}(\varepsilon) = \frac{1}{N} \sum_{\xi=1}^{N} |u_{\xi} - u_{\xi}^*|^2, \]  

(2)

where \( u_{\xi} \) is the value of the element of the initial message \( U(0) \);

\( u_{\xi}^* \) is the value of the message element \( U(0) \), which is obtained in the process of reconstruction of VIR data.

3. The number of distorted pixels affecting the quality of visual perception of video images, which is determined by the following formula:

\[ \Omega = \frac{N(u_{\xi}^*)}{N(u_{\xi})} \times 100\%, \]  

(3)

where \( \Omega \) is the number of distorted (erroneous) pixels, which affects the quality of visual perception, for the developed method;

\( N(u_{\xi}^*) \) is the number of distorted pixels affecting the quality of visual perception of video images;

\( N(u_{\xi}) \) is the number of pixels affecting the quality of visual perception of video images.

Assessment of the reliability of video information in air segment information communication systems by the indicator of the peak signal/noise ratio \( \text{PSNR}(\varepsilon) \) at a given level of errors in data transmission channels is shown in fig. 3–4. In fig. 3–4 show, obtained as a result of practical research, the value of the peak signal/noise ratio for images with different degrees of saturation. Obtained results of simulation of the reconstruction process VIR at a given level of errors in the data transmission channel (discrete symmetric channel without memory), which is \( P(\varepsilon) = 10^{-5} \), indicate that the best conditions for using the developed method are the coding of moderately saturated video images (Fig. 3).

Fig. 2. Test images: a) weakly saturated; b) medium saturated; c) highly saturated
Source: a) [43]; b) [44]; c) [45].

Fig. 3. Diagram of the dependence of the peak signal-to-noise ratio at a given level of errors \( P(\varepsilon) \) from the degree of image saturation, \( P(\varepsilon) = 10^{-5} \)
Source: developed by authors.

Fig. 4. Diagram of the dependence of the peak signal-to-noise ratio at a given level of errors \( P(\varepsilon) \) from the degree of image saturation, \( P(\varepsilon) = 10^{-4} \)
Source: developed by authors.
This is due to the fact that at a given level of errors in the data transmission channel, the developed method allows obtaining better results for moderately saturated images – the value of the peak signal-to-noise ratio is 20.81 dB, which is 5.2% higher than the value of the peak signal-to-noise ratio noise for highly saturated images and by 27.8% – for weakly saturated images.

Accordingly, at the level of errors in the data transmission channel, which is \( P(\varepsilon) = 10^{-4} \), the use of the developed method for encoding images with different degrees of saturation allows the following results to be obtained (Fig. 4):

- the value of the peak signal-to-noise ratio for medium-saturated images is 18.03 dB;
- the best conditions for using the developed method are coding of medium-saturated video images.

This is due to the fact that the value of the peak signal-to-noise ratio for the specified images exceeds by 7.6% the value of the peak signal-to-noise ratio for strongly saturated images and by 19.2% for weakly saturated images.

In turn, for existing methods of compression coding (arithmetic coding, the Huffman method), which are actively used in modern video information coding algorithms, modeling the indicated level of errors in the data transmission channel leads to the fact that the value of the peak signal/noise ratio approaches zero, i.e. \( PSNR(\varepsilon) \rightarrow 0 \). This is due to the fact that the occurrence of errors in the process of VIR reconstruction for these methods has an avalanche effect, which leads to the destruction of video information. Therefore, it is proposed to carry out a comparative evaluation of the developed method with existing coding technologies.

Comparative evaluation of the reliability of video information in infocommunication systems of the air segment by the indicator of the peak signal/noise ratio \( PSNR(\varepsilon) \) at a given level of errors in data transmission channels with algorithms of the JPEG family is shown in Fig. 5–6.

Analysis of the results of VIR data reconstruction at a given level of errors by the value of the peak signal/noise ratio is presented in Fig. 5–6 shows that:

1. The use of the developed coding method allows increasing the level of reliability of VIR data at a given level of errors in the reconstruction process. So for the case when the error in a discrete symmetric data transmission channel without memory is given by a value equal to \( P(\varepsilon) = 10^{-5} \), the use of the developed coding method allows to increase the reliability of video information, which is determined by the quantitative assessment of the peak signal/noise ratio, by an average of 53.08% compared to existing methods.

Accordingly, for the second studied case (if \( P(\varepsilon) = 10^{-4} \)) the developed method allows to increase

![Diagram of the dependence of the peak signal-to-noise ratio at a given level of errors \( P(\varepsilon) \) from the degree of image saturation for the developed and existing methods, \( P(\varepsilon) = 10^{-5} \). Source: developed by authors.](image)

2. The developed method of video information compression coding solves the scientific problem of increasing the reliability of video information in air segment info-communication systems. This means that the following condition is fulfilled: \( PSNR(\varepsilon) \geq PSNR(\varepsilon)_{req} \) namely \( PSNR(\varepsilon)_{dm} \geq 15–25 \) dB.

In turn, the results of estimating the number of distorted pixels affecting the quality of visual perception of video images under the conditions of errors in data transmission channels for the developed compression coding method are shown in Fig. 7.
Fig. 7. Diagram of the dependence of the number of distorted pixels affecting the quality of visual perception of video images on the level of errors $P(\varepsilon)$ in the data transmission channel for the developed method.

Source: developed by authors.

The analysis of the data shown in Fig. 7 shows that:

1) for the developed method of compression coding, the number of distorted pixels affecting the quality of visual perception of video images, under the conditions of a given level of errors in the data transmission channel, is:
   - in average $\Omega_{dm} = 4.6\%$ with an error level equal to $P(\varepsilon) = 10^{-5}$;
   - in average $\Omega_{dm} = 5.8\%$ with an error level equal to $P(\varepsilon) = 10^{-4}$;

2) for weakly saturated video images at the studied error levels in the process of reconstruction of VIR data value $\Omega_{dm}$ is 5.3% for the case when $P(\varepsilon) = 10^{-5}$ and 6.1% – for the case when $P(\varepsilon) = 10^{-4}$;

3) for highly saturated video images at given levels of errors in the process of data reconstruction, VIR value $\Omega_{dm}$ is 4.6% for the case when $P(\varepsilon) = 10^{-5}$ and 5.8% – for the case when $P(\varepsilon) = 10^{-4}$;

4) the best conditions for using the developed method are coding of medium-saturated video images. This is due to the fact that the amount of distorted pixels affecting the quality of visual perception of video images, when $P(\varepsilon) = 10^{-4}$ for the specified class of video images, it is 11% less in value $\Omega_{dm}$ for weakly saturated video images and by 5.5% – for strongly saturated video images. Accordingly, for the case when $P(\varepsilon) = 10^{-5}$ size $\Omega_{dm}$ for moderately saturated video images, it is 26.2% less in value $\Omega_{dm}$ for weakly saturated and, accordingly, by 9.5% – for strongly saturated video images.

It should be noted that for existing methods of compression coding, which are actively used in video compression algorithms, modeling the specified level of errors in the data transmission channel leads to distortion of most video image pixels. Size $\Omega_{em}$ approaches 100%, i.e. $\Omega_{em} \to 100\%$. This is due to the fact that the use of the mentioned methods of VIR data compression coding does not allow to localize the effect of errors, but leads to an avalanche effect, that is, the destruction of video information in the reconstruction process. Therefore, it is proposed to carry out a comparative evaluation of the developed method with existing compression coding technologies. A comparative assessment of the number of distorted pixels affecting the quality of visual perception of video images under the influence of errors in data transmission channels for the developed compression coding method and the existing method (JPEG) is shown in Fig. 8–9.
Analysis of the data shown in Fig. 8–9 shows that:

1. The use of the developed coding method allows increasing the level of reliability of VIR data at a given level of errors in the reconstruction process. So for the case when the error in a discrete symmetric data transmission channel without memory is given by a value equal to $P(\varepsilon) = 10^{-5}$, the use of the developed method of compression coding allows to reduce the number of distorted pixels, which affect the quality of visual perception of video images, in comparison with the existing method by an average of 10–17 times. Accordingly, for the second studied case (if $P(\varepsilon) = 10^{-4}$) the number of distorted pixels affecting the quality of visual perception of video images is reduced by an average of 16–18 times compared to the existing method.

2. The developed method of compression coding solves the scientific problem of increasing the reliability of video information in information communication systems using airborne platforms. This means that the following condition is fulfilled:

$$\Omega \leq \Omega_{req}, \text{namely } \Omega_{dn} \leq 7 – 8\%.$$  

**Comparative analysis of estimates of visual distortion of video images at a given level of errors for the developed and existing coding technologies**

Next, it is proposed to carry out a comparative analysis of estimates of visual distortion of video images in the reconstruction process at a given level of errors for the developed method and existing coding technologies, using the JPEG format as an example.

The results of the reconstruction of the investigated example of a weakly saturated video image using the simulation of errors during transmission in a discrete symmetric channel without memory for the developed and existing methods are shown in Fig. 10–11.

Analyzing the results of the reconstruction of an undersaturated video image for the developed and existing methods for the investigated variants of the occurrence of errors (Fig. 10–11), the following conclusions can be drawn:

1) for the case when the probability of occurrence of errors is given by values equal to $P(\varepsilon) = 10^{-4}$ and $P(\varepsilon) = 10^{-5}$, the use of the existing method leads to the destruction of VIR data during the reconstruction process (Fig. 10–11, options b));

2) for both studied examples ($P(\varepsilon) = 10^{-4}$, $P(\varepsilon) = 10^{-5}$) using the developed method of compression coding allows to increase the reliability of video information. This is due to the fact that the developed method makes it possible to localize the destructive effect of errors occurring in the communication channel (Fig. 10–11, options c)).

![Fig. 10](image1.png)  
Source: a) [43]; b), c) developed by authors

![Fig. 11](image2.png)  
Source: a) [43]; b), c) developed by authors.
In fig. 12–13 show the results of the reconstruction of the investigated example of a medium-saturated video image using error modeling in the process of video information reconstruction during transmission in a discrete symmetric channel without memory for the developed and existing methods.

Fig. 12. The results of the reconstruction of an average saturated video image with a given level of errors in the data transmission channel, $P(\varepsilon) = 10^{-4}$: a) test image; b) existing method; c) developed method

Source: a) [44]; b), c) developed by authors.

Fig. 13. The results of the reconstruction of an average saturated video image with a given level of errors in the data transmission channel, $P(\varepsilon) = 10^{-5}$: a) test image; b) existing method; c) developed method

Source: a) [44]; b), c) developed by authors.

The analysis of the results of the reconstruction of an medium saturated video image for the developed and existing methods for the investigated variants of the occurrence of errors (Fig. 12–13) shows that:

1) for the case when the probability of occurrence of errors is given by the value equal to $P(\varepsilon) = 10^{-4}$, the use of the existing method leads to the destruction of VIR data during the reconstruction process (Fig. 12, option b));

2) for the case when the error probability in a discrete symmetric channel without memory is given by a value equal to $P(\varepsilon) = 10^{-5}$, the use of the existing method leads to a significant visual distortion of VIR data in the reconstruction process (Fig. 13, option b)), which complicates the process of visual assessment of the semantic component of the video information resource. This leads to the fact that the level of reliability of video information does not correspond to the necessary;

3) for both investigated examples, the use of the developed compression coding method allows to increase the reliability of video information. This is due to the fact that the developed method allows you to localize the effect of errors, which ensures a reliable assessment of the semantic component of the video information resource. Thus, the use of the developed method allows you to determine the key information (country, product, serial number, etc.) that is displayed on board the aircraft (Fig. 12–13, options c)).

Accordingly, the results of the reconstruction of the studied example of a highly saturated video image using error modeling in the process of video information reconstruction during transmission in a discrete symmetrical channel without memory for the developed and existing methods are shown in Fig. 14–15.

Analyzing the results of the reconstruction of a highly saturated video image for the developed and existing methods with the specified error levels (Fig. 14–15), the following conclusions can be drawn:

1) for the case when the probability of occurrence of errors is given by a value equal to $P(\varepsilon) = 10^{-4}$ the use of the existing method, as well as for the two previous
research results (weakly and moderately saturated images), leads to the destruction of VIR data in the reconstruction process (Fig. 14, option b));

2) for the case when the probability of occurrence of errors is given by the value that is equal to $P(\varepsilon) = 10^{-5}$ the use of the existing method leads to a significant reduction in the visual distortion of VIR data in the reconstruction process compared to the case when $P(\varepsilon) = 10^{-4}$ (Fig. 15, option b)). However, this does not allow to ensure the appropriate level of reliability of video information.

Thus, for the analyzed example, in the process of reconstruction of VIR data, the semantic component is lost (the car in Fig. 15, option b)).

3) This leads to the fact that the reliability of the video information is lost;

![Fig. 14. Results of the reconstruction of a highly saturated video image at a given level of errors in the data transmission channel, $P(\varepsilon) = 10^{-5}$: a) test image; b) existing method; c) developed method. Source: a) [45]; b), c) developed by authors.](image)

![Fig. 15. Results of the reconstruction of a highly saturated video image at a given level of errors in the data transmission channel, $P(\varepsilon) = 10^{-4}$: a) test image; b) existing method; c) developed method. Source: a) [45]; b), c) developed by authors.](image)

4) for both studied examples ($P(\varepsilon) = 10^{-4}$, $P(\varepsilon) = 10^{-5}$) using the developed method of compression coding allows to increase the reliability of video information. This is due to the fact that the developed method allows to localize the effect of errors, which ensures the creation of conditions for the possibility of visual assessment of the semantic component of the video image.

**Conclusions**

The analysis of experimental evaluations obtained by using the developed software product allows us to conclude that the use of the developed video information coding method ensures an increase in the level of reliability of video data in information communication systems at a given level of errors:

- the use of the developed coding method allows to increase the level of reliability of VIR data at a given level of errors in the process of reconstruction by the value of the peak signal/noise ratio. So for the case when the error in a discrete symmetric data transmission channel without memory is given by a value equal to $P(\varepsilon) = 10^{-5}$ the use of the developed coding method allows increasing $PSNR(\varepsilon)$ on average 53.08% compared to existing methods. Accordingly, for the case when $P(\varepsilon) = 10^{-4}$ the developed method provides an increase $PSNR(\varepsilon)$ on average 93.8%:
 – the use of the developed coding method allows to increase the level of reliability of VIR data at a given level of errors in the reconstruction process in terms of the number of distorted pixels that affect the quality of visual perception of video images. So for the case when the error in a discrete symmetric data transmission channel without memory is given by a value equal to 

\[ P(\epsilon) = 10^{-5} \]

the use of the developed method of compression coding allows to reduce the number of distorted pixels, which affect the quality of visual perception of video images, in comparison with the existing method by an average of 10-17 times.

Accordingly, for the second studied case (when 

\[ P(\epsilon) = 10^{-4} \]

) the number of distorted pixels affecting the quality of visual perception of video images is reduced by an average of 16-18 times compared to the existing method.

 – the use of the developed method of encoding video information ensures: increasing the reliability of video data in information communication systems based on the assessment of visual distortion. This means that at a given level of errors arising in the process of reconstruction of VIR data, the developed method allows for localization of the action of errors. Thus, when decoding VIR data, there are no significant psycho visual changes in video information. In turn, the use of existing methods of compression coding does not allow localizing the effect of errors, which leads to the destruction of the data of the video information resource in the reconstruction process. A comparative analysis of estimates of visual distortion of video images in the process of reconstruction at a given level of errors for the developed method and existing coding technologies, using the JPEG format as an example, shows that the existing coding technologies do not allow to ensure the necessary level of reliability of video information. This is due to the fact that existing coding technologies do not allow localizing the effect of errors, which leads to significant distortion (destruction) of video information;

 – the best conditions for using the developed method from the point of view of increasing the reliability of video data in information communication systems are the use for medium-saturated video images.

Next, it is proposed to analyze the effectiveness of the developed method from the point of view of ensuring the required level of operational efficiency of video information delivery in air segment info-communication systems.

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Створення моделі оцінки достовірності відеоданих для технології компресійного кодування в умовах дії помилок в каналі передачі даних

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Досліджується технологія компресійного кодування відеоданих для інфокомунікаційних систем аеросегменту. Відмінними рисами розробленої технології є наступні: структурна декомпозиція інформаційного простору за структурною ознакою; використання двохєрархічної схеми статистичного кодування. Особливістю запропонованої технології є використання статистичного підходу в процесі формування інформаційної частини кодограми та маркера (ідентифікатору) кодової конструкції в вихідній кодовій послідовності. Це дозволяє створити умови для локалізації дії помилок, що виникають в процесі доставки відеоданих в інфокомунікаційних системах аеросегменту. Створюється модель оцінки ефективності запропонованої технології компресійного кодування відеоданих. Особливістю створеної моделі є використання як кількісних, так і якісних показників спотворень даних інформаційного ресурсу в умовах дії помилок в каналах передачі даних. Проводиться порівняльний аналіз розробленої технології з методами кодування без втрат (метод Хаффмана) та існуючими технологіями компресійного кодування, побудованими на базі платформи JPEG. Перевагами запропонованої технології є забезпечення локалізації дії помилок за рахунок використання додаткових службових відомостей (ідентифікаторів) про кодову конструкцію, що формується в процесі статистичного кодування даного відеоінформаційного ресурсу.

Ключові слова: відеозображення, структурна ознака, реструктуризація, кодування, достовірність.