

Bavarian State Ministry of Education and Cultural Affairs



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Bavarian State Ministry of Education and Cultural Affairs, 80327 Munich

To the President of the
Bavarian Parliament
Mr. Alois Glück, MdL
Maximilianeum
81627 Munich

Your reference number / Your message from

Our reference number (Please include it on all correspondence.)
I.6-5 O 1350.1/5/5

Munich, 23/08/2007
Phone: 089 2186 2643
Name: Mr. Brunnermeier

Decision of the Bavarian Parliament from 21 June 2007 (Print Copies 15/7464, 15/8257) Protecting Children at School from Radiation Exposures Final Report

Dear Mr. President,

In execution of the above-stated decision, I submit the following report:

Every year the advisory council for school computers of the Bavarian State Ministry of Education and Cultural Affairs publishes a revised version of its advisory paper *Votum* whose goal it is to provide schools and funding sponsors with the information needed to make the best possible decisions regarding new acquisitions and replacements of computers and peripheral devices. The paragraph on wireless local area networks in this year's *Votum* was revised according to the above-stated decision of the Parliament and published with the following wording on the Bavarian education server on 28 June 2007 (cf. <http://www.schule.bayern.de/votum/Votum.pdf>, page 12):

“Before making a decision to install a wireless network, the debate about electromagnetic pollution needs to be addressed. Studies on exposure levels have been carried out by various institutes, e.g. on behalf of the University of Bremen (Report on the Measurements of Radiation Exposures from Radiofrequency Electromagnetic Radiation Caused by Wireless Networks at the University of Bremen, see also <http://www.dmn.tzi.org/wlan/wlan-empvu-gutachten-bremen.pdf>). According to this report, the exposure levels are well below the relevant exposure limits but are highly dependent on the power output and direction of the antennas.

The debate concerning the summation effect of the various radiation sources such as wireless networks and cell phones at schools is highly controversial. A comparison with the currently valid exposure limits shows that the exposure levels measured by the Federal Office for Radiation Protection are very low. As a reply to requests from individual schools, however, the Federal Office for Radiation Protection did not recommend to use wireless networks when a wired network solution can offer the same performance. If a wireless network is used, the Federal Office for Radiation Protection recommends finding a suitable location for the various wireless network components (see also

http://www.bfs.de/bfs/druck/infoblatt/Bluetooth_WLAN.html and <http://www.bfs.de/elektro/papiere/Anhoerung.pdf>).

When notebooks are used, a wireless connection to the school network may be useful and economic. In the case of stationary computers (e.g. computer lab), a wired connection is usually preferable. If a wireless network is installed, the access points should only be turned on during active use.

No final statements on the radiation effects of wireless networks can be made as of now. It is recommended to engage the school community into a discussion on this issue prior to the proposed implementation of a wireless network.”

All Bavarian schools were informed about the updated paragraph in the *Votum* by an e-mail to their official mail boxes of the Ministry of Education and Cultural Affairs on 28 June 2007, thereby making everybody aware of the above-stated decision of the Parliament with the following words:

“We would especially like to draw your attention to the paragraph on wireless networks

(WLAN) in section 4b (Networking of Computers, School Network) on page 12, which addresses the decision of the Bavarian Parliament from 21 June 2007 that required to inform schools and funding agencies about the statements of the Federal Office for Radiation Protection from 7 December 2006 (legislative hearing). For precautionary reasons the Federal Office for Radiation Protection recommends for schools that if a wireless network is used to place its components in suitable locations and to prefer the use of wired network solutions whenever possible (cf. <http://www.bfs.de/elektro/papiere/Anhoerung.pdf>).”

With the messages of the Ministry of Education and Cultural Affairs from 28 June 2007 No. I.6-5 O 1371.1/1/8 and from 3 July 2007 No. I.6-5 O 1371.1/1/9, the updated *Votum* was sent as an attachment to the departments of the official education authorities (governments, ministry offices, and school boards) and school funding organizations (incl. municipal umbrella organizations). In these messages the above-stated decision of the Bavarian Parliament was also pointed out:

*“A note about the updated *Votum* was sent to all schools via their e-mail boxes on 28 June 2007. The paragraph on wireless networks (WLAN) in section 4b (Networking of Computers, School Network) on page 12 was pointed out in particular, which addresses the decision of the Bavarian Parliament from 21 June 2007 that required to inform schools and funding agencies about the statements of the Federal Office for Radiation Protection from 7 December 2006 (legislative hearing). For precautionary reasons the Federal Office for Radiation Protection recommends for schools that if a wireless network is used to place its components in suitable locations and to prefer the use of wired network solutions whenever possible* (cf. <http://www.bfs.de/elektro/papiere/Anhoerung.pdf>).”

Yours sincerely,

Siegfried Schneider
State Minister



Parliament of Hesse

9 April 2010

Parliamentary Inquiry

By **Cárdenas (DIE LINKE)**, MdL Hesse, from 11/02/2010

RE: Use of Laptops and Wireless Networks (WLAN) and the Associated Health Risk for Children and Adolescents at Hesse Schools – Part 2

and

Reply

By the Minister of Cultural Affairs

Preliminary Remark by Inquirer:

The use of IT technologies at schools has become indispensable by now. Computers are not only used during computer science classes. In many subjects they are an ever-present tool for design and information processing. The use of these applications will continue to increase so that teaching at school will more and more turn into work at a “computer workplace.” This development touches on all types of schools and grades and thus also on different developmental stages of children and adolescents, which demands a differentiated approach.

Generally speaking, the use of these technologies in schools is to be welcomed. It is alarming, however, that at the same time this also leads to an increased number of laptops (notebooks) and internal wireless devices (WLAN, Bluetooth) in the learning environment whose use is recommended and promoted by the Hesse government (cf. reports at the HKM-Forum schule@zukunft). On both accounts, however, there are serious health concerns involved, especially for children and adolescents who are still developing. They, therefore, require our urgent attention in the school setting if the learning success with these new technologies shall not result in physical disabilities and health problems.

Specific Preliminary Remark:

At this time the use of laptops at Hesse schools is associated with an increasing use of wireless network technologies at all types of schools and at all grade levels. Due to some advantages during use, frequently the wireless network solution is chosen even when there is wired Internet access available.

During use of wireless network technologies, both the access points as well as the individual laptops emit pulse-modulated, radiofrequency (RF) electromagnetic radiation which may **cause adverse health effects. Especially for children and adolescents** who are

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[Translator’s Note: This is an unofficial translation. The original German document is available at http://download.bildung.hessen.de/medien/einrichtungen_medien/support/Drucksache_18_1924_Laptop_WLAN_Gesundheitsgefaehrdung_an_Schulen.pdf]

still developing, this has not been sufficiently studied to date. Even though the currently valid exposure limits of the 26th BImSchV are complied with during operation of such wireless networks, both the Federal Office for Radiation Protection (BfS information sheet July 2005) as well as the German Federal Government (print copy 16/6117) **recommend to reduce and keep the personal exposure to RF electromagnetic fields as low as possible** in order to meet health risks in this way. By way of precaution, the Federal Office for Radiation Protection recommends to use **conventional wired connections** when it is possible to **forego the use of Bluetooth or wireless network solutions**. In general, the major **wireless access points shall not be placed** in areas where people spend a considerable amount of time such as at a workplace, i.e. in our case **the rooms of a school**.

These BfS recommendations also take into account the needs of those people who increasingly respond to electromagnetic field exposures with physical symptoms (cf. German Mobile Telecommunication Research Programme (DMF) Protocol “Electromagnetic Hypersensitivity”, BfS 16 June 2006). **The 6% of the total population who (already) respond in this way almost certainly include students and teachers.**

In a decision from 22 March 2007 (br-online.de), the Bavarian parliament asked its schools to **forego the use of wireless Internet networks such as Wi-Fi because of health concerns and instead to go back to wired network solutions**. In an additional decision from 21 June 2007 (print copy 15/8409) on “Protecting Children at School from Radiation Exposures,” the state government was asked to inform the school authorities about the statements and recommendations of the Federal Office for Radiation Protection.

In Hesse, health risks associated with the use of wireless network technologies have not yet been considered in political decisions. Only the School Department of the City of Frankfurt has declared that “as long as the safety of wireless communication is not clarified (...) **WLAN networks must not be used at Frankfurt schools**” (FR 08/06/06).

As can be read in various documents at the Web site of the media initiative “Schule@Zukunft [School@Future]” (e.g. keyword WLAN at www.schuleundzukunft.de), the use of wireless networks is described as the optimal solution for schools and various arguments are put forward that consider wired Internet connections to be negative and unfavorable. In the publications of the Ministry of Education and Cultural Affairs, the potential adverse health effects associated with the use of this technology are not mentioned.

To date, the school offices, school boards, teachers, parents, and students have not been informed by the Hesse government about the concerns and recommendations of the Federal Office for Radiation Protection regarding the use of Bluetooth and WLAN at schools. **The precautionary principle** with its call for minimizing harmful impacts on humans—which **should especially apply to children and adolescents**—as promoted by the Federal Environment Agency in its full-length report “Late Lessons from Early Warnings” from 2004 has not been implemented at Hesse schools.

With wired Internet connections, this could easily be changed without compromising the technical qualities. Moreover, this would also have the advantage that such computer connections can be used for exams. Because, just like other wireless connections, WLAN and Bluetooth are not bug-proof (WLAN sniffer) and thus can be influenced from the outside. For reasons of legal certainty, exams can only be administered **via wired connections**, which then could be used in regular class.

In agreement with the Hesse Ministry of Labor, Family and Health, I reply to the parliamentary inquiry as follows:

Question 1 What percentage of Hesse schools use wireless networks and how many use exclusively wired connections for their Internet access?

From the schools that participated in the Hesse-wide IT online poll, 12% use wireless connections and **88% wired connections for their Internet access.**

Question 2 As a rule, how far apart are the major WLAN access points from the areas where students and teachers usually spend most of their time? And how frequently are the access points located close to students in their classrooms or on laptop carts?

In a school, the distance between a student laptop and a WLAN router usually ranges from three to thirty meters. The power density of the electromagnetic field decreases with the square of the distance. In this context the impact of the electromagnetic fields emitted by the cell phones of the students must be considered to be much stronger. The maximum power output of a WLAN router is 100 mW and that of a cell 2,000 mW.

Question 3 How does the Hesse Government plan to implement in schools (and other public facilities) the recommendations of the Federal Office for Radiation Protection (BfS) or German Government, respectively, that calls for minimizing the exposure to electromagnetic fields?

The power output of WLAN is per frequency channel 100 milliwatt at 2400 MHz, 200 milliwatt at 5150 and 5350 MHz, and 1,000 milliwatt at 5470 through 5725 MHz. Due to the relatively low power output levels, the 26th Ordinance on the Implementation of the Federal Immission Control Act regarding Electromagnetic Fields (26. BImSchV) does not apply to these wireless devices.

The exposure level of WLAN devices depends on their power output and the respective data traffic. At maximum data traffic load, the exposure level is at its highest and rapidly decreases with increasing distance to the transmitting antenna. According to measurements carried out as part of the German Mobile Telecommunication Research Programme, internationally recommended reference values for this frequency range are met by WLAN devices and usually their emissions are well below them. The project results show that WLAN devices in typical user settings cause exposure levels that are

0.1% of the reference values recommended by the Council of the European Union (1999/519/EG).

Health-relevant biological effects of RF electromagnetic fields below the exposure limits could not be verified by nationally and internationally recognized expert commissions. The new results of the German Mobile Telecommunication Programme confirm this. Apart from that, uncertainties about the health effects of WLAN-capable devices worn close to the body are still the subject of research.

The question as to whether wireless or wired network solutions should be preferred is the responsibility of the local school authority.

It can be assumed that the school authorities most certainly follow the recommendations of the Federal Office for Radiation Protection to reduce the personal exposure to electromagnetic fields in order to keep potential health risks as low as possible.

Furthermore, the Parliament of Hesse will continue to pursue questions of ergonomics and radiation exposure together with the Hesse school authorities within the framework of the joint initiative “Schule@Zukunft.”

Question 4 Is it possible to forego the use of WLAN (and Bluetooth) in schools, especially in elementary and junior high schools, and to use computers with wired connections only?

To reduce the exposure to electrosmog but also to provide the computers with faster access to the school network, a wired connection should be given preference wherever possible.

For this, however, school authorities need to lay the necessary groundwork. Classrooms must be fitted with many, easily accessible network ports. Desks must be arranged in such a way that cluttered network cables do not pose a risk to students.

In isolated cases a wired network will not be possible due to the structural makeup of the school building. Due to pedagogical requirements, it may occasionally also be impossible to forego the use of flexible, supplementary learning tools.

Question 5 Will the Hesse Government inform the school authorities, teachers, parents, and students about the health concerns and BfS recommendations regarding the use of WLAN?

School authorities, teachers, parents, and students have already been informed about this issue.

For several years the Office for Teacher Education has uploaded information about questions concerning WLAN to the Hesse education server as part of the school

computer support. This also includes documentation about the viewpoints on the WLAN issue. As far as possible, this information is updated on a continuous basis.

Question 6 Which options do teachers, parents, and students have to participate in the decision as to whether a given school uses for its computers in the classroom a low-emission network with wired connections or a wireless network associated with potential health risks?

The Hesse School Act does not provide any provisions for participating in questions about the equipping of schools.

At the same time, school authorities invite committees to participate in the decision-making processes in a spirit of cooperation based on trust. When notebook classes are introduced, for example, all school committees as well as the parents are involved.

Question 7 Which options do teachers and students suffering from electrosensitivity documented by a written medical confirmation note have to be excused from teaching or learning with emitting devices and in school rooms fitted with wireless technologies (WLAN; Bluetooth, DECT, etc.)?

“Electrosensitive” people require adequate (environmental) medical help.

At any time members of the teaching staff can consult the school’s occupational health office.

In the case of students or their legal guardians, respectively, the public health authority is called in when a written medical confirmation note is submitted. In cooperation with the medical doctor who issued the confirmation note, the parents or students, the school and public health authority, a decision will be made about the options to attend school depending on the available diagnosis.

In this context it is very important to point out that to date—despite numerous scientific studies—no causal relationship between the presence of electromagnetic fields and health complaints or the corresponding “electromagnetic hypersensitivity” could be established; within the framework of the German Mobile Telecommunication Research Programme, several research projects had been carried out on “electromagnetic hypersensitivity.”

Question 8 Which rules and actions ensure that school computers cannot be manipulated from the outside during exams?

If in computer science classes questions are asked that require the use of a computer, the school administrator must ensure that it is impossible to have unauthorized access to either the local or global networks. This usually means that students work at isolated workstations. If a network specifically designed for the exam environment is used,

relevant technical solutions ensure that neither unauthorized network access nor exchanges are possible.

Question 9 How does the Hesse Government make sure in the future that legitimate concerns of intended actions regarding media use will be broadly communicated, discussed, and considered during the decision-making process?

Within the framework of the joint initiative “Schule@Zukunft,” the state government and the school authorities jointly explore the questions of media use. During the development of standards, the aspects mentioned in the above question are integrated in a suitable manner.

Wiesbaden, 31 March 2010

Dorothea Henzler

The Governing Council of Thurgau Canton to the Parliament

Frauenfeld, 4 August 2008

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Parliamentary Inquiry on Wireless LAN at Elementary, Junior and Secondary High Schools by Fabienne Schnyder from 10 June 2008

Reply

Dear Mr. President:

Dear Ladies and Gentlemen:

WLAN or Wireless Local Area Networks just like cell phones and their base stations belong to the so-called “radio frequencies,” that is, the data to be transferred between devices are not transmitted via a cable but via the airwaves by means of radiofrequency electromagnetic radiation. The Department of Nonionizing Radiation of the Swiss Federal Office of Public Health publishes various information sheets on electromagnetic fields (EMF) including WLAN¹. It says there that currently it is not known whether electromagnetic fields of wireless networks pose a health risk. In general, WLAN devices emit rather low levels of radiation. However, it goes on to say that it is only prudent to exercise caution especially when using WLAN devices held close to the body such as PDAs, laptops, and VoIP phones. The same applies to cell phones and other mobile phones. The critical attitude of the public is probably less based on available studies and practical experiences than rather in the face of scientific uncertainty on a fundamentally defensive attitude toward EMF-emitting transmitters and base stations. This weariness, however, dissolves quite quickly when small mobile devices that can communicate wirelessly with each other are actually used such as cell phones, laptops, and peripheral devices. The attitude of the public is not free of contradictions, which is reflected in the often strong opposition against cell phone base stations and the simultaneous widespread use of cell phones. The opposition of parents concerned about wireless network installations in schools is also not free of contradictions when the same parents outfit their children with cell phones and other electronic devices whose radiation exposes their children for even longer periods of time than just during schooltime.

¹ <http://www.bag.admin.ch/themen/strahlung/00053/00673/03570/index.html?lang=en> 16 July 2008

Against the background of these statements, the Governing Council replies to the posed questions as follows:

Question 1

The Governing Council has issued regulations concerning electrosmog prevention for the administration of Thurgau canton on 2 May 2006. The cantonal schools are bound by the scope of the regulations. Public elementary schools are free to make their own decisions regarding this issue, but it is recommended that they also follow the regulations. When there is no compelling reason for mobility, **a conventional wired network should be given preference over a wireless network installation.** From a long-term perspective, **wired networks may even be more advantageous than wireless ones.**

Question 2

The use of wireless networks varies among cantonal schools. Frauenfeld cantonal school **forgoes the use of wireless networks** on principle. **Exceptions** are made **during public and special events.** On those occasions the access point (base station) is specifically installed for these events and **removed immediately afterward.** Romanshorn cantonal school and teacher grammar school use wireless networks with restrictions as to time and space. In contrast, Kreuzlingen cantonal school finds the application of wireless networks indispensable. At the vocational colleges of the canton, individual classrooms are fitted with wireless networks. In the cafeteria and in the new buildings of the Thurgau University of Teacher Education (PHTG), wireless networks are being installed now. In the old buildings and in the department of natural sciences, selected rooms are also slated for the installation of access points.

There is no overview of wireless network installations in public schools. But it can be assumed that right now only very few schools have wireless networks installed.

Question 3

The Governing Council recommends for schools to forgo the use of wireless networks when the structural makeup of a given school building allows for a wired network.

Question 4

a) Pursuant to § 19 of the Fee Structure Ordinance (RB 411.611), the Department of Education and Cultural Affairs has issued regulations about the requirements for school buildings. These regulations could be amended with instructions about conventional wired networks and wireless installations, if need be. However, they would only apply to new school buildings or renovation projects but not already existing school buildings. As a general rule, the school board is responsible for the provision of a school's infrastructure; it must also

communicate its decision regarding the use of wireless networks to the public of its school district. It is quite possible that the public's acceptance of wireless networks varies in individual school districts. Without a legal basis, the Governing Council cannot interfere in the decision-making responsibility of school boards regarding the outfitting of school buildings.

b) In executing its responsibilities, the **Governing Council has issued the regulations concerning electrosmog prevention for all its employees of the cantonal administration.** The current task sharing between the canton and the school districts does not allow the Governing Council to issue directives concerning electromagnetic pollution in place of the school authorities responsible for it.

The President of the Governing Council

The State Clerk

[Translator's Notes:

This is an unofficial translation. The original Swiss document is available at http://www.grgeko.tg.ch/docs/00000064_00000E85_WEB.pdf

The Governing Council is the highest executive authority in a canton.

Cantonal schools are roughly equivalent to high schools.]

